Dental Digest

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April 1956

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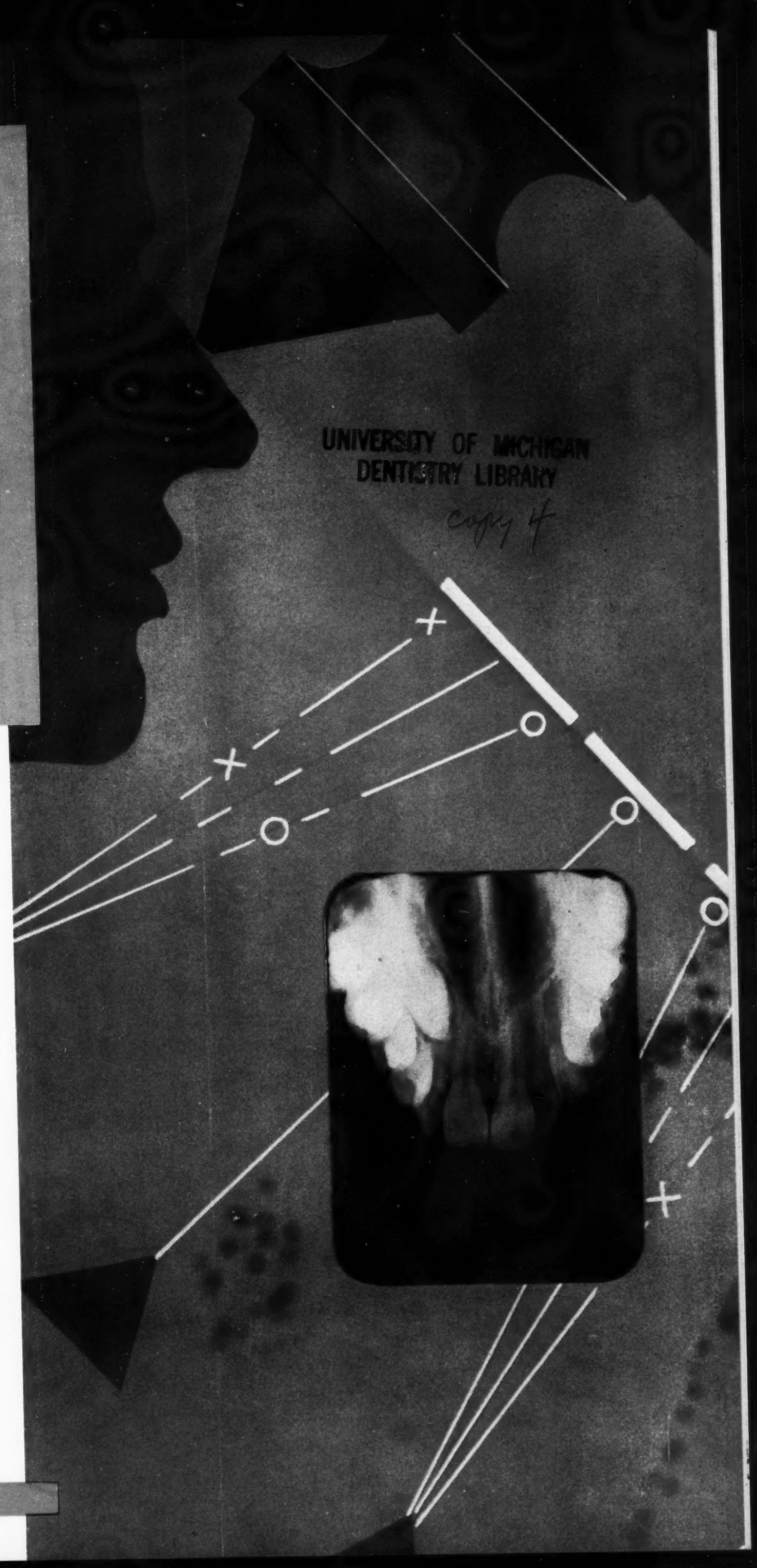

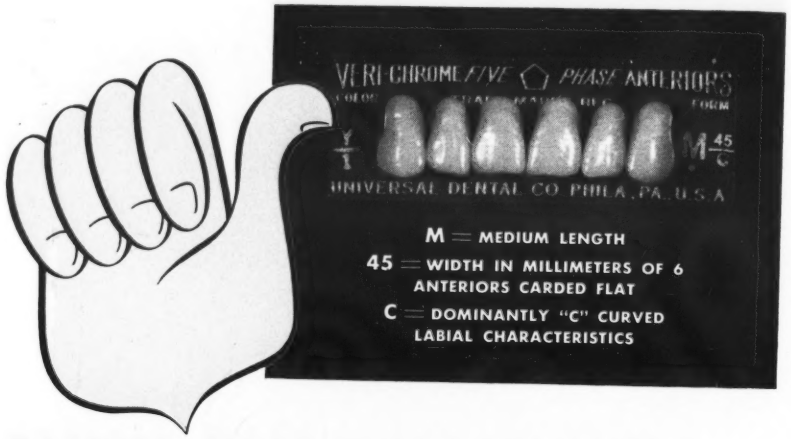
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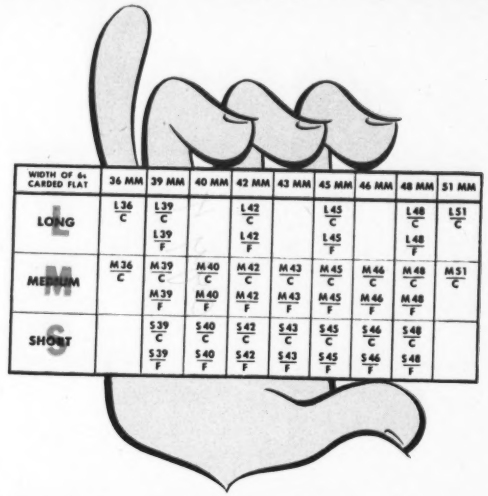

WIDTH OF 6 CARDED FLAT	36 MM	39 MM	40 MM	42 MM	43 MM	45 MM	46 MM	48 MM	51 MM
LONG L	L36/C	L39/C, L39/F		L42/C, L42/F		L45/C, L45/F		L48/C, L48/F	L51/C
MEDIUM M	M36/C	M39/C, M39/F	M40/C, M40/F	M42/C, M42/F	M43/C, M43/F	M45/C, M45/F	M46/C, M46/F	M48/C, M48/F	M51/C
SHORT S		S39/C, S39/F	S40/C, S40/F	S42/C, S42/F	S43/C, S43/F	S45/C, S45/F	S46/C, S46/F	S48/C, S48/F	

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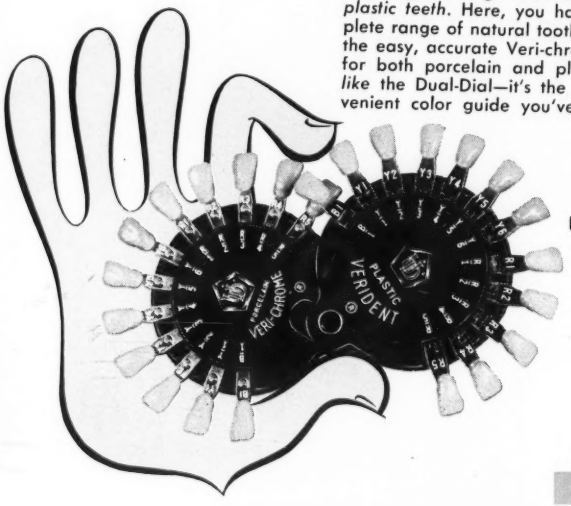

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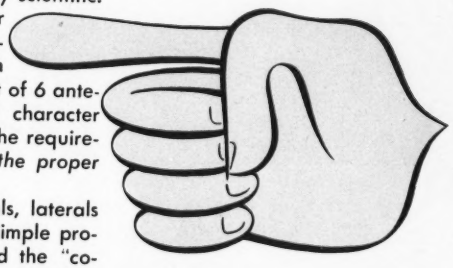

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Vol. 62, No. 4

Dental Digest

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About Our CONTRIBUTORS

ROBERT A. ATTERBURY, B.S., D.D.S. (University of Illinois, College of Dentistry, 1942), Assistant Professor of Oral Surgery and Head of the Department of Hospital Oral Surgery, University of Illinois Research and Educational Hospitals, is also consultant in oral surgery at the Westlake Hospital in Melrose Park and attending oral surgeon at MacNeal Hospital, Berwyn, Illinois. Collaborating with SUNDER VAZIRANI, D.D.S. (University of Bombay, College of Dentistry, 1952) who is Resident Oral Surgeon, University of Illinois Research and Educational Hospitals, presents RETENTION OF TEETH IN FRACTURE LINE AS AID IN IMMOBILIZATION OF MANDIBULAR FRACTURE.

HARRY MAETH, D.D.S. (Columbia University, 1925) known for his many contributions to DIGEST in which he has reported his research in dental applications of Fiberglas and Oxycel, the use of terramycin in dental infections, and unusual cases from his clinical experience presents THE IMPORTANCE OF COMPLETE X-RAY EXAMINATION OF ALL PRIMARY MOLARS AND OPERATIVE TREATMENT OF CARIOUS LESIONS OF SUCH TEETH: A CASE HISTORY.

BEN H. HAINES, D.D.S. (University of Southern California, College of Dentistry, 1941) specializes in oral surgery and prosthetics. For his first appearance in DIGEST, Doctor Haines presents LOCALIZATION OF IMPACTED MAXILLARY CUSPIDS.

HARRY L. PAGE, educated at Hotchkiss and Yale is widely known as an authority on prosthetics. Mr. Page's many original articles on the various aspects of this subject which have been published in DIGEST have attracted considerable attention. This month he presents the first of a two-part article, TRANSOGRAPHICS AND THE TRANSOGRAPH.

HAROLD L. HAMBURG, B.S. (City College of New York, 1942), D.D.S. (New York University, College of Dentistry, 1946) is a general practitioner. Doctor Hamburg presents in the current issue the second of his two-part article, GENERAL ANESTHESIA FOR THE DENTAL PRACTITIONER.

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The magazine is mailed on the fifteenth of the month of issue.

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Retention of Teeth in Fracture Line as Aid in Immobilization of MANDIBULAR FRACTURE

ROBERT A. ATTERBURY, B.S., D.D.S., and SUNDER J. VAZIRANI, D.D.S., Chicago

DIGEST

The retention of a tooth in the fracture line has long been a debatable subject. Each case requires judgment of a highly specialized technical nature which should be directed toward (1) the establishment of a normal function and occlusion, and (2) the prevention of infection and facial disfigurement. This article reports a case of a bilateral mandibular fracture in which it is demonstrated that a tooth in the line of fracture need not always be removed.

Conservative and Radical Procedures

Straatsma and Rhoads[1], in discussing maxillofacial emergencies, state that loose teeth present in the fracture lines should be removed as they interfere with healing, setting up a foreign body reaction.

Simple Method of Retention—Another authority, Padgett[2], states that when a lower third molar comes in contact with the upper third molar in a fracture at the angle, the lower third molar can often be used advantageously to hold the posterior fragment down and back. If a tooth suffices for this purpose, it is by far the simplest method of retaining the posterior fragment in place.

Conservative Treatment Successful—Concerning teeth in the line of fracture and the relative merits of conservative and radical surgical procedure in these cases, the following case history is presented.

Case Report

History—A 34-year-old white male was admitted to the Oral Surgery Service of the Illinois Research and Educational Hospitals for the treatment of facial fractures. The patient had been in an automobile accident and was unconscious for a period of ten hours. He was admitted to a nearby hospital immediately after the accident where he was observed for possible head injury and for the treatment of multiple facial lacerations.

Results of Initial Examination—Mandibular and frontal sinus frac-

1. ***Showing fracture of left condylar neck in fair position and a bilateral comminuted mandibular fracture.***

[1]Straatsma, Clarence R., and Rhoads, Harman T.: Maxillofacial Emergencies, Surg. Clin. North America, p. 563 (April) 1955.

[2]Padgett, E. C.: Surgical Diseases of the Mouth and Jaws, Philadelphia, W. B. Saunders Company, 1944, p. 12.

2. ***Lateral view showing displacement of the posterior fragment with retention of teeth in fracture line.***

tures were diagnosed. Further examination revealed no evidence of bleeding from the ears or nose, no diplopia, and no neurologic signs of sensory disturbances. After eight days, the patient was referred to the Oral Surgery Service of the Illinois Research and Educational Hospitals.

Physical Examination—The following conditions were revealed in physical examination:

(1) Healing lacerations over the right eyebrow and forehead.

(2) Swelling of the area over the left temporomandibular joint and right side of the mandible.

(3) Bilateral crepitation and grating of the posterior fragments between the angle of the mandible and body of the anterior mandibular fragments.

(4) Marked evidence of malocclusion.

The remaining physical conditions were within normal limits.

Laboratory Investigation—Studies of the skull and jaw revealed a depressed skull fracture involving the outer table of the frontal sinus. Other conditions were the following:

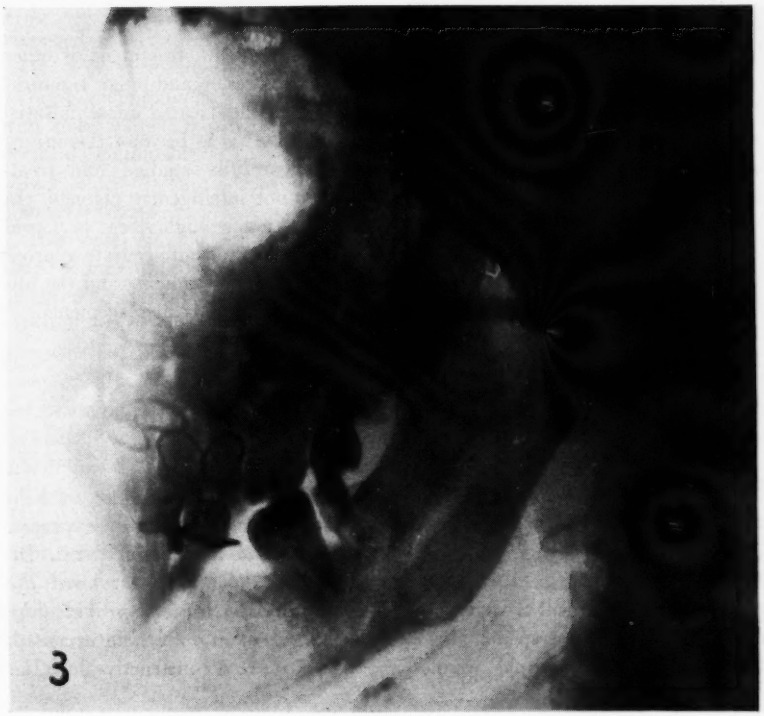
(1) A fracture of the left condylar neck which was in fair position and a bilateral comminuted mandibular fracture (Fig. 1).

(2) Considerable displacement of the posterior fragment of the right side which had become displaced upward because of the unfavorable plane of the fracture line and the pull of the elevator muscles (Fig. 2).

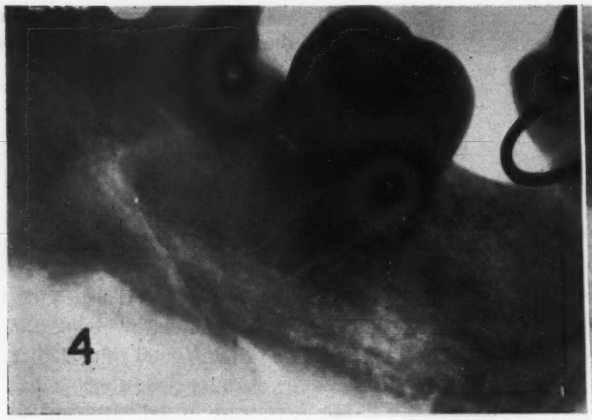
(3) The fracture on the left side was in the area of the second molar. The maxillary teeth were moderately good, and firm.

Other physical conditions, including blood and urine analysis, were within normal limits.

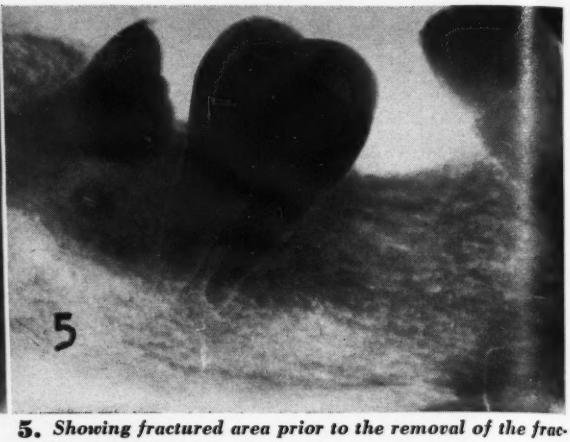
Treatment—The patient was given



3. ***Reduced and fixed in normal occlusion with the aid of the distal fractured tooth fragment controlling the otherwise edentulous posterior fragment.***



4. ***Showing fractured area with fractured tooth fragment at three weeks.***



5. ***Showing fractured area prior to the removal of the fractured tooth fragment.***

a local anesthetic and reduction and fixation of the mandibular fractures were accomplished by the use of Blair and Ivy loops and intermaxillary stainless steel wire fixation in normal occlusion. The right mandibular fragments were reduced adequately with the help of a distal fractured tooth fragment in the line of fracture (Fig. 3).

Hospital Course Uneventful — An antibiotic was administered intramuscularly for five days. Liquid diet was maintained for the first two weeks and was then modified to a soft diet. The hospital course was uneventful.

Postoperative Progress—The patient was observed in the outpatient service. Six weeks later the intermaxillary wires were removed and elastic traction was applied for one week. Occlusion was satisfactory and mandibular function was normal. Postoperative radiographic examination showed sufficient union. The Blair and Ivy loops and elastic traction were removed.

No Symptoms of Infection—The patient's recovery was uneventful and at no time were there any symptoms of an acute infection about the fractured tooth or mandible. This was confirmed with clinical and radiographic evidence (Fig. 4).

Patient Discharged—Three months later the fractured distal tooth fragment was removed and the patient was tentatively discharged (Fig. 5).

Discussion

Compared with treatment of other bony fractures, mandibular fractures are as a rule treated most unsatisfactorily. This is because the injury is not carefully studied and treatment is not intelligently planned. In addition, not enough stress is placed on the importance of accurate approximation of the fragments and the offsetting of muscular displacements.

Temporary Retention may be Useful—When there is a tooth in the posterior fragment, which for surgical reasons should be removed at once, it is sometimes advisable to temporize and utilize the tooth for the control of the otherwise edentulous posterior fragment. This type of treatment may obviate the need for a more complicated method. The tooth need only be retained until sufficient repair has taken place to prevent displacement.

Advantages vs. Disadvantages—The decision to retain a tooth in the fracture line must be made with extreme care. The advantages of the tooth as a means of control must be weighed against its adverse effect upon the healing of the fracture. The decision should also consider intelligent and adequate antibiotic therapy.

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The Importance of Complete X-RAY EXAMINATION *of All Primary Molars and Operative Treatment of Carious Lesions of Such Teeth: A Case History*

HARRY MAETH, D.D.S., Mosinee, Wisconsin

DIGEST

This case history in which the patient was a child of eleven who had been advised to have the maxillary deciduous molars extracted, demonstrates the importance of a routine survey of all primary teeth, especially when extractions are contemplated. The restorative therapy employed in the case is described and illustrations are presented of the teeth before and after corrective treatment.

Extractions Advised

When first seen, the patient, a girl of eleven years and ten months of age, was accompanied by her mother who stated that another dentist had advised that the patient's maxillary deciduous second molars be extracted at once "to make room for the permanent teeth coming in soon."

Results of Examination

X-ray examination of the left maxillary second deciduous molar and the right maxilary second deciduous molar revealed the following condition: (1) Complete absence of tooth buds or developing bicuspid teeth at the periapical areas of the teeth in question. (2) Carious lesions in each of these teeth.

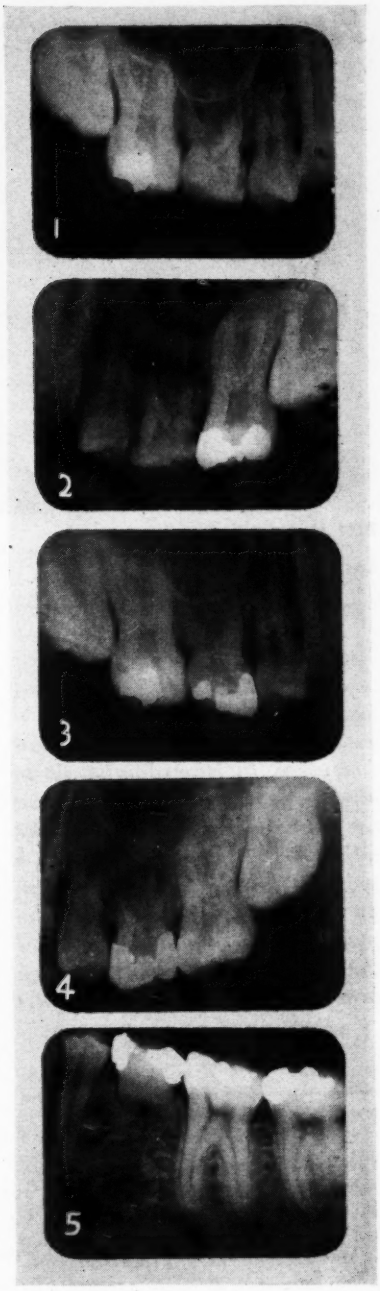
Therapy

(1) Under local anesthesia the caries was removed from these primary molars, and the cavities were prepared for restorations. (2) Each tooth was restored with amalgam. (3) At a subsequent visit the teeth were polished and adjusted to correct occlusal relationship.

Conclusions

This case emphasizes the importance of a routine x-ray survey of all primary teeth, especially when any extractions are being contemplated or planned. The need of operative treatment of all carious lesions of all deciduous molars is also emphasized. In this case it was advised that an x-ray and follow-up examination of the deciduous teeth recently restored be completed every six months. The situation described also demonstrates that the time-worn cliche, "these baby teeth will have to come out anyway" is untenable.

Mosinee, Wisconsin



1. *and* **2.** *Maxillary right and maxillary left primary second molar teeth, each tooth affected with caries.*

3. *and* **4.** *Maxillary right and maxillary left primary second molar teeth, with corrective restorations.*

5. *Another deciduous tooth, the right second primary molar that was restored with an amalgam restoration in 1943 is shown. The patient is now 23 years of age. Upon recent routine x-ray examination the primary tooth was found to be serviceable and comfortable.*

Localization of Impacted MAXILLARY CUSPIDS

BEN H. HAINES, D.D.S.,
Las Cruces, New Mexico

DIGEST

An experience that is not soon forgotten by the dentist is to study an occlusal x-ray, palpate the buccal and labial sides of the adjacent teeth, and then lay a palatal flap to remove an impacted cuspid which is not in the palate. This article emphasizes the factors that must be taken into consideration by the dentist

(Continued on next page)

1. *Occlusal view, 65° angulation with point of cone over bridge of nose.*

2. *Same angulation as in Figure 1, but with the point of the cone shifted to the area of the infraorbital foramen. This view discloses curvature of the cuspid root and when compared with Figure 1, gives positive evidence that the tooth is not a palatal impaction. Note change in relationship of the cuspid to the central incisor.*

3. *When these two views taken from the central and cuspid positions are compared, the impaction is diagnosed as labially displaced. Note that as the point of the cone was shifted distally, the projected image of the impacted cuspid was shifted mesially.*

in the case of surgery for an impacted cuspid tooth and recalls the basic rules to be observed in the interpretation of x-ray views in this situation.

Results Gained from Experience

Several things can be learned from this experience:

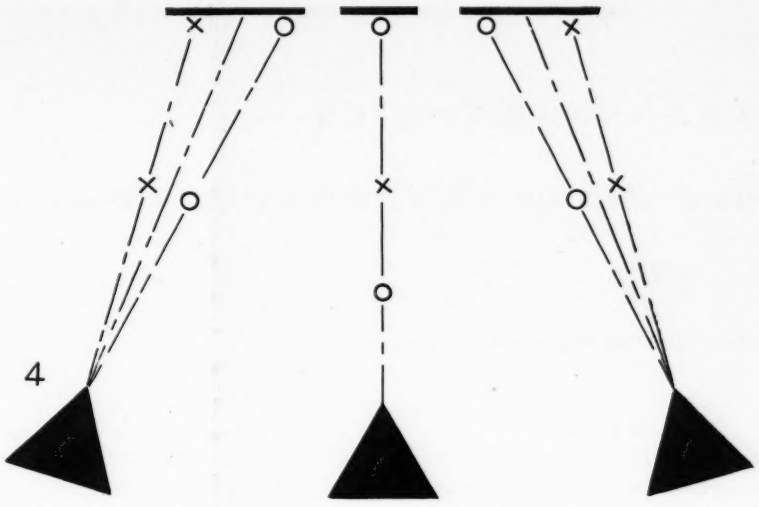
(1) The bulge over the crown of a labially or buccally displaced cuspid may be absent or be so slight as to avoid detection.

(2) Several roentgenograms are necessary to determine from roentgenograms alone whether the tooth is buccally or palatally displaced.

(3) The oral surgeon should make his own diagnosis in every case and not operate on the basis of a diagnosis by the referring dentist such as "Left cuspid, palatal impaction."

Roentgen Ray Interpretation

A single x-ray, whether a periapical or an occlusal view (Fig. 1), discloses that a tooth is present somewhere between the cone of the x-ray and the film. It does not localize the tooth.



4. *Note that the projected X moves in the same direction as the cone.*

Effect of Movement Distally—(1) If the cone of the x-ray is moved distally and a second exposure made (Figs. 2 and 3), the operator will notice that the relationship of the impacted tooth to the other teeth has changed. (2) If the cone was moved distally and the image of the impacted tooth was shifted distally, then the impacted tooth is in the palate.

Basic Role Recalled—If the projected image of the impacted tooth moved mesially in relationship to the other teeth, then it is located labially or buccally to the other teeth. This rule which is taught in every dental college, may be quickly recalled by drawing the simple diagrams shown in Figure 4.

271 *West Griggs*

Correction

To the Editor:

Doctor Harry Sicher has written me that he believes the manner in which the quote I have used in my article THE OPENING AXIS OF THE JAW, page 18, January 1956 issue of DIGEST, with the caption *Statement Confirmed*, is erroneous and carries the implication that Doctor Sicher agrees with my findings which he *emphatically does not*.

The use of the caption *Statement Confirmed* was an unfortunate error. The only purpose of the quote used by me, reading as follows, "the place for the entry for the nerves and blood vessels must be at the point which is relatively stable and where the excursions of the mandible are the smallest. This point is, in the human mandible, the place where the mandibular foramen and sulcus mylohoidens begin. In the complicated mechanisms of the human articulation there is one optional point, and this point must be the common place of entrance for both nerves and blood vessels," was to stress the point of entry into the mandible of the nerves and blood vessels and was not meant to imply in any sense that Doctor Sicher had "confirmed" my findings.

I would appreciate your publishing this correction.

Sincerely yours,
Leonard Frank
450 Sutter Street
San Francisco 8

TRANSOGRAPHICS

and the TRANSOGRAPH — *Part One*

HARRY L. PAGE, Valparaiso, Indiana

DIGEST

Conventional dental literature supports the articulation concepts in current use as sound and considers that it is impossible to duplicate functional jaw movements with any mechanical device. The purpose of this article is to demonstrate that standard concepts are outmoded and that an accurate, functional articulator is a natural and inevitable product of the present age.

Four Important Principles

Transographic articulation is based upon four principles the importance of which was stressed originally by the leader of the Gnathological Society of California, Beverly B. McCollum. Without an understanding and application of these principles, attempts to articulate natural or artificial teeth become conjectural and empirical. This opinion of conventional articulation is apparently shared by Boucher[1] who states, "It seems that there are nearly as many ways to solve the problem of jaw relations and occlusion as there are dentists. This has caused confusion in the minds of some to the extent that they know not which way to turn."

First Principle—The transverse condylar rotational control center or axis to which McCollum gave the name "hinge-axis" is the first principle. Hinge-axes are also the origins and terminals of all condylar *translational* movements, the significance of which is often lost even among hinge-axis users.

Second Principle—This is the cranial plane which ensures the accurate reproduction of off-sagittal-plane jaw movements in the articulator and which McCollum called the "axis-orbital plane."

Third Principle—The bodily shift of the entire mandible in function, long (and vaguely) recognized as the "Bennett movement" is the third principle.

Fourth Principle—The "envelope of motion" which postulates that when control over the basic tridimensional movements of a mechanism has been captured, any extrinsic movement will integrate automatically is the fourth principle. For instance, once control over the basic three-dimensional jaw movements (sagittal, horizontal, and transverse) has been obtained and transferred to a suitable articulator, simple laterals or verticals or any combination of them, when made in the articulator, will be exact duplicates of the same motions when made by the jaw itself.

The Hinge-Axis

While the principles of Gnathology and Transographics are the same, their interpretation and application are quite different. Gnathology contends that a hinge-axis is a theoretic, single, rigid axle running through the head from a finite *point* in one condyle to a finite point in the other condyle.

Alleged Center of Rotation—Referring to the axes of the condyles that control motion in the three dimensions, Granger[2] states: "All of these axes meet at a point within the condyle. This is the mysterious center of rotation. When these points in the two condyles are connected by an imaginary line, it forms the hinge-axis."

Constant Relationship of Hinge Axis Claimed—In an attempt to support the Gnathologic claim that the hinge-axis is constant to the mandible and meniscus Granger[3] continues, "We might compare this to a typical ball bearing. As the ball is turning, the outer ring and the inner ring, which together comprise the race, are turning in opposite directions to each other. The balls are rotating with respect to the race. Yet, in all of this motion, the axial [sic] center of the ball remains in constant relation to the walls of the race. In the same fashion, the axis of the condyle remains in constant relationship to the meniscus."

Condyles not Directly Connected—Transographics claims that Granger's concept misses the significance of the anatomic fact that the condyles are not connected directly through the skull but have their junction at an offset point; the symphysis (Fig. 1). This is an important distinction; it makes each condyle independent and places the condylar pivotal bearings against the fossae in different sagittal planes much as two main bearings of a piston-driven motor are in different sagittal planes with respect to the crank bearing.

Torque Results in Bodily Shift of Jaw—Even as two misalined main engine bearings would create a torque resulting in violent motor vibration when the crank shaft revolved, so the universal asymmetry in condylar position, size and shape creates a torque resulting

[1]Boucher, Carl O.: Jaw Relations and Occlusion in Complete Dentures, J. Pros. D. **5**:299 (May) 1955.

[2]Granger, Ernest R.: Centric Relation, J. Pros. D. **2**:161 (March) 1952.

[3]Ibid.: **2**:164.

in a collateral bodily shift of the jaw when it rotates open or closed in function. The condyles being loosely encapsulated, this shift is consummated readily. The articulatory significance of this will be developed shortly.

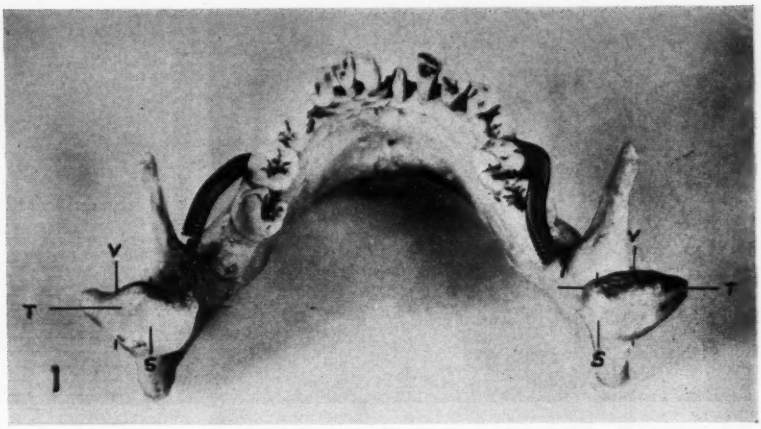
Condyle and Ball Bearing Dissimilar—Transographics also asserts that a condyle is in no way comparable to a ball bearing. A ball bearing rotates at will within its race and is a perfect sphere. A perfect sphere has an infinite number of diameters or axes, all intersecting at a common point; the exact center of the ball. No matter which one of the countless possible positions this ball may occupy in its race, it will both rotate and translate around that constant *point* (not "axial") center.

Perfect Glenoid Fossae Required—A ball bearing rotates and translates in a uniformly biconcave race, a condition that could be duplicated in physiology only by a perfect glenoid fossa. A *perfect* glenoid fossa exists nowhere in the human body with the possible exception of the scapula; certainly the mandibular fossa is far from being glenoid.

Condyle has Three Rotational Axes—In common with all nonfree, *irregular* bodies, a condyle has, in effect, only *three* rotational axes; transverse, vertical and sagittal. *The rotational axes of an irregular body never intersect* (Fig. 1). Each bypasses the others and, depending upon the size and irregularity of the body, at considerable distances.

Theory Untenable—A condyle being an irregular body, Granger's statement: "All of these axes meet at a point within the condyle," is untenable. Since there is no common axes intersection within a condyle, there can be no point acting as a "mysterious center of rotation" while a single, intercondylar hinge-axis joining "these two points in the condyles" is impossible.

Significant Facts in Articulator Design—An instrument predicated upon a single intercondylar axis and rotating around a single, rigid axle supported at each end by a point (ball) bearing automatically incorporates a kinematic error in every mounting, for the torque that duplicates the bodily shift of the jaw is missing. Such an articulator opens and closes in one plane perpendicular to its axle and can be accurate at only *one static position*, that is, the occlusal separation at which the case was mounted. The instant it is opened or closed from this occlusal separation, its movements become misleading approximations of jaw movements. This will apply even though the case has been mounted to a true hinge bite.



1. ***(T) Transverse hinge-axis: (V) Vertical hinge-axis: (S) Sagittal hinge-axis (schematic).***

Discrepancy Illustrated — Comparative tests by McIver[4] portray graphically the discrepancy between the patient's major jaw movements (opening and closing) and the supposedly identical articulator movements made by an instrument that opens and closes on an arc lying wholly within a plane perpendicular to the articulator axle. C and D in Fig. ures 2 and 3 show the erroneous and misleading result when teeth have been moved into closure from a hinge bite mounting made in such a single axle, point-bearing articulator.

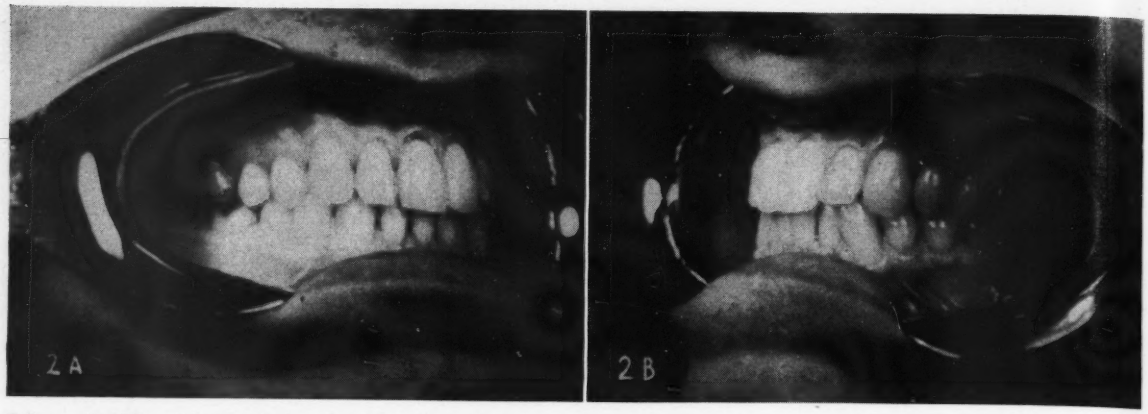
Correct Occlusion Duplicated — E and F in Figures 2 and 3 show the true picture and the duplication of correct mouth occlusion when these teeth were moved into closure from *the same hinge bite mounting* made in a Transograph. Since the closure movements started from the same departure points in both articulators, the paths of movement *must* be quite different to produce such divergent terminals following exactly the same amount of closure. Opening or closing being components of every functional jaw movement, this inaccuracy cannot fail to infiltrate the entire functional synergy.

Use of Transverse Hinge-Axes Successful—The condyles, being irregular in shape, none of the individual condylar axes is *entirely* constant even in simple rotation. When the locus of their consecutive centers is plotted during *extensive* rotation with no forward movement of the condyle involved, the result must take the form of an evolute curve as corroborated recently by Hjortsjo.[5] Fortunately, the axes are so nearly constant through the important segment of the final closure arc that they make the location and the use of the transverse hinge-axes in functional jaw closure practical and successful.

Combined Movement Paths Duplicated—So far no sound method has been developed for locating and utilizing the actual vertical and sagittal hinge-axes. Nevertheless, it is entirely feasible to duplicate with sufficiently finite accuracy the combined jaw movement paths that are governed by these hinge-axes through the use of pantographs or equivalent controls.

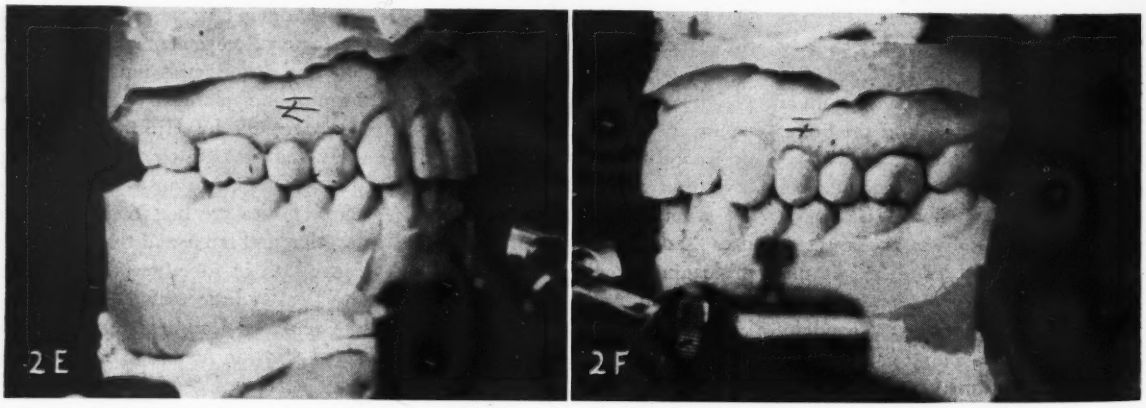
[4]McIver, Lawrence W.: Analysis of Jaw Relation in Treated Class II Malocclusion, Angle Orthodon. **24**:46-49, (January) 1954.

[5]Hjortsjo, Carl-Herman: Studies of the Mechanics of the Temporomandibular Joint, Hakan Ohlssons Boktryckeri, 1955, p. 8



2A. *and* **2B.** *Hinge occlusion in subject's mouth.*

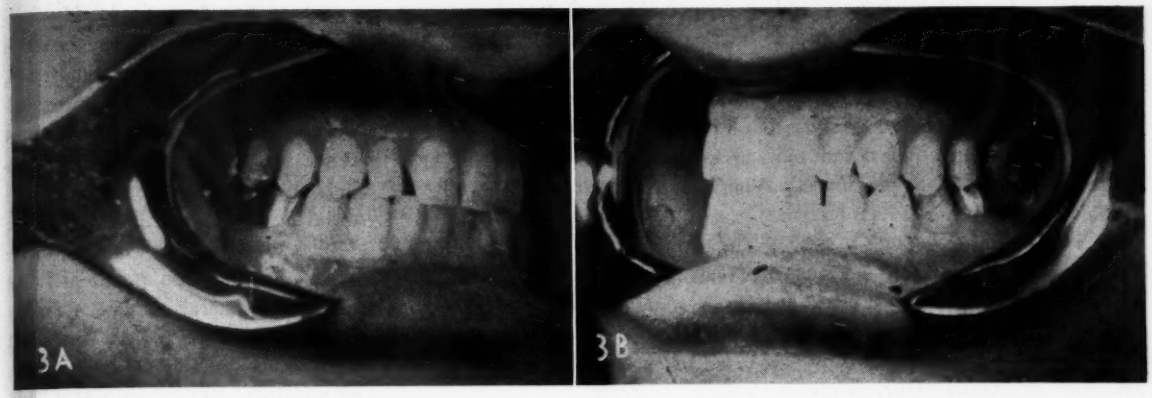
2C. *and* **2D.** *Hinge occlusion on conventional articulator.*



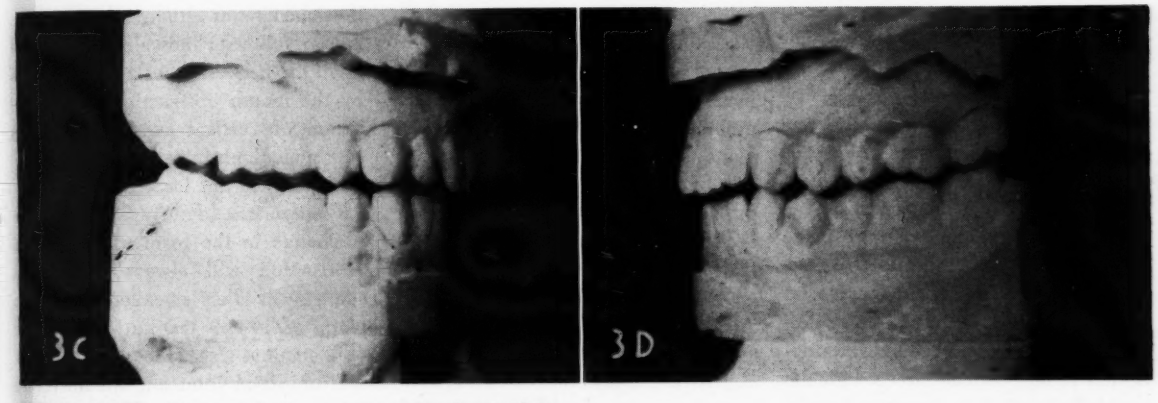
2E. *and* **2F.** *Hinge occlusion on Transograph.*

Condylar Axes not Constant to the Mandible — Hjortsjo[6] has demonstrated that the fossal slope resembles somewhat a parabolic curve when viewed in the sagittal plane, a curve that is almost congruent with the so-called "condyle path." This, added to the fact that the condylar axes are not absolutely constant to the mandible or meniscus even in simple rotation, suggests that a transverse hinge-axis could not even begin to approach constancy to the mandible or meniscus during combined rotary and lateral movements. It appears, therefore, that Granger's statement ". . . the axis of the condyle remains in constant re-

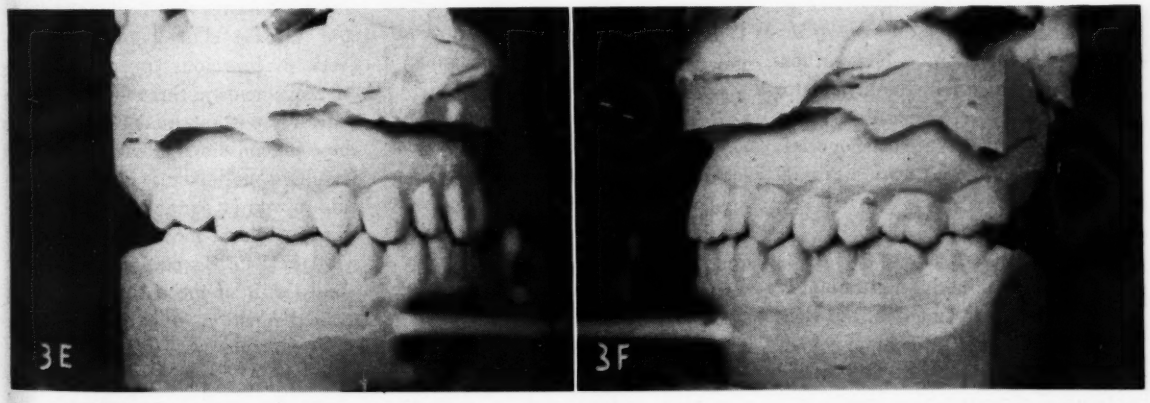
[6]Op. cit.: p. 10.



3A. *and* **3B.** *Hinge occlusion in subject's mouth.*



3C. *and* **3D.** *Hinge occlusion on conventional articulator.*



3E. *and* **3F.** *Hinge occlusion on Transograph.*

lationship to the meniscus" is an unsupported rationalization.

Problem of Articulation Simplified —Because of these biomechanical irregularities, Transographics began with the premise that, just as there are two independent vertical and two independent sagittal hinge-axes, naturally there must be two independent transverse hinge-axes in every head, one in each condyle. They operate as independent theoretic, nonintersecting *axal* (not point) centers and result in what is known as a "split" or "broken hinge-axis." This concept has proved to be exceptionally accurate both kinematically and statically and has also simplified the articulation problem decisively.

The Cranial Plane

Basically, there is no difference between the Gnathologic "axis-orbital plane" and the Transographic "cran-

ial plane." Gnathology locates and permanently marks with a tattoo dot on the skin of the nose the level of an adjacent point on one infraorbital arch. In subsequent operations it uses a plane having this point and the hinge-axes dots (also permanently marked) as the apexes of its reference or axis-orbital plane.

Variation in Method — Transographics uses the same hinge-axes projections united with any convenient anterior cranial point to form its reference or cranial plane. While in Transographics the hinge-axes projections are sometimes tattooed when a case appears to be routine, the anterior apex of the cranial plane is not marked for future use. A new cranial plane is used each time.

Importance of the Cranial Reference Plane—These cranial reference plane differences are not in conflict; the only important consideration being that *some* cranial reference plane be located on the head and be transferred intact to the articulator. Unless this is done, the natural off-sagittal-plane jaw movements cannot be duplicated in *any* articulator because the angles between these movement paths and the mounted maxilla will not be the same as in the head.

Articulator Must be Capable of Accepting Cranial Plane—It is of extreme importance that the articulator be capable of accepting and of utilizing a cranial plane (almost none is), otherwise an attempt to use a cranial plane will fail.

The Bennett Movement

Gnathology maintains that the bodily shift of the jaw in function, the Bennett movement, is a component of bruxomatic, radial-protrusive lateral motions. Transographics asserts that the true Bennett movement is a component of the natural, functional jaw movements, the major ones of which are the opening and closing. The Bennet movement is caused, as mentioned previously, by the unitary jaw mechanism attempting to rotate on asymmetrically positioned, sized, and shaped condylar pivotal bearings.

Transographic Equivalent of Bennett Movement—The movement is captured by and transferred automatically to the Transograph through the use of the broken hinge-axes resulting from independent axal centers of rotation for each condyle. In the articulator these independent asymmetrical *axal* centers are made to copy exactly the head axal center relationships and these, in turn, cause the Transograph to flex[7] (as it is designed to do) thus producing the equivalent of the Bennett movement. No complicated or special mechanisms are necessary.

The Envelope of Motion

It should be reemphasized that articulators having a single axle supported at each end by point (ball) bearings must open and close on an arc that lies wholly within a single plane perpendicular to the axle. In opening and closing they can produce pure rotary motion only, motion that is rarely, if ever, possible in the human jaw.

Gnathologic Concept—With only the pure rotary opening and closing movements that lie strictly within that *one* plane under transverse hinge-axis control, Gnathology affirms that pantographic tracings of the subject's bruxomatic radial-protrusive laterals (combined outward and forward jaw movements) constitute the balance of his "envelope of motion."

Radial Protrusive Laterals Recorded—These bruxomatic radial-protrusive laterals are recorded as dual, one-dimensional pantographs (gothic arch tracings) at the incisals and as two-dimensional pantographs alongside each condyle.

Control in One Plane Inadequate—Transographics states that a single transverse intercondylar hinge-axis control over movement in only one plane during opening and closing is inadequate, that control must be extended to include the off-sagittal-plane Bennett movements taking place in the simple jaw opening and closing and must also be coordinated with the control of the medial-protrusive movements as the subject engages in final, preconscious functional closing.

Bruxomatic Laterals Outside Functional Range—In addition, the claim is made that all bruxomatic laterals, whether radial-protrusive or medial-retrusive, are outside of functional range and produce only pantographs indicating jaw movements that are distal to, that is, outside, of function.

Obstructions in Mouth Artificial—Transographics also points out that bruxomatic laterals made against any obstruction in the mouth whether it be a natural barrier such as cusps or an unnatural obstacle such as a "center bearing pin and plate" are wholly artificial. These artificial lateral movements or their pantographs merely follow or indicate paths forced upon the helpless translating condyles by the mouth obstructions. True location of vertical axes' positions is extremely doubtful while sagittal axes' positions are not located at all.

Condyle an Adaptive Mechanism—A change in the form of the mouth obstruction will always produce a change in the so-called "condyle path," for the translating condyle (the one that traces the condyle path) is a universal joint and all universal joints are adaptive mechanisms.

Transographic Concept — Transographics argues that it alone captures and utilizes control over the subject's preconscious *functional*, occlusal movements in three dimensions. In the all-important final closing stroke these preconscious movements are the simultaneous medial (inward), vertical (upward), and protrusive (forward) occlusal movements combined with the true Bennett movement, the bodily shift of the entire jaw during normal function.

Mechanisms and Method Uncomplicated—All functional movements except the medial component of the protrusive movement and the transverse plane closure angle are controlled and duplicated automatically by virtue of the Transographic broken hinge-axis. Incorporation of the medial component of the protrusive movement and the transverse plane closure angle with their complementary arcs will be covered more fully later.

Function is Motion—Articulation

[7]Page, Harry L.: The Bennett Movement, DENTAL DIGEST, **57**:412-414, (September) 1951.

is function and function is kinematics, that is, motion. This motion must be captured and duplicated in the articulator if teeth are to be set up or cusps are to be fashioned so that there will be no interferences when the restorations are installed in the mouth. This applies whether the case be dentulous or edentulous or any combination of the two.

Centric Relation Unnecessary—Since Transographics captures and utilizes functional movements, there is no need for centric relation. The only jaw position where function and centric relation can coincide is that fixed jaw position where the teeth are in complete occlusion and the jaw is motionless. Function having already ended at this point, centric relation has no value in kinematic articulation.

Bruxomatic Laterals Discarded—Being outside of and playing no part in function, bruxomatic laterals have also been discarded by Transographics. The only point where function and bruxomatic laterals can coincide is at centric relation and the reasons for discarding centric relation have just been given.

Closest Approach Indicated in Gothic Arch Tracing—The closest that function and bruxomatic laterals can approach each other during natural function is indicated by any gothic arch tracing. Its wings represent the forward extent of all functional movements and the rearward extent of all bruxomatic laterals at any given opening.[8] Bruxomatic laterals do not cross this line into the functional field nor does function cross this line into the bruxomatic lateral field.

Simple Occlusion Destroyed by Bruxomatic Laterals — It has been proved both mathematically and clinically that bruxomatic laterals will destroy even simple occlusion when they are used for any articulating purpose such as "milling," "balancing," or "pantographing."[9]

(End of Part One)

104 *Garfield Avenue*

[8]Page, Harry L.: The Hinge Bow, DENTAL DIGEST **58**:535, (December) 1952.

[9]Page, Harry L.: An Appraisal of Balance, DENTAL DIGEST, **60**:202-203, (May) 1954.

Appearance Phase of Denture Construction

M. M. DEVAN, D.D.S., Philadelphia

Conclusion

The appearance phase of denture construction presents a dentist with the opportunity to play the role of an artist. To employ and develop one's innate artistic talents is no small opportunity. It is on the basis of appearance that one may soundly justify an appreciable differential in fee. It is conceivable for two sets of dentures to be identical in their mechanical aspects, but it is inconceivable for two men to produce identical esthetic results. There are too many variables in background, mood, and temperament. Two men would have to feel alike to create alike.

The dentist who does not take full advantage of the artistic opportunities that organizing the dental composition provides is both improvident and unwise. He is casting aside a unique type of experience—born out of esthetic endeavor—the experience of forgetting himself and feeling free. For one may be free in fact but only through artistic creation can one feel this freedom.

From *New York Journal of Dentistry* **25**:64 (February) 1955.

Milk Powders and Rat Caries

F. J. McCLURE, and J. E. FOLK

Conclusions

1. Rats fed diets in which the protein was supplied in the form of three different skimmilk powders, developed smooth-surface caries which occurred predominantly on lower buccal areas.

2. The incidence of caries and the average number of teeth affected, varied in a manner which paralleled the severity of the heat treatment necessary for the preparation of the milk powders. Diets containing spray-process and roller-process powders were both much more cariogenic than a diet containing a lypholized milk powder. The most severe cariogenicity was associated with the diet containing a roller-process powder.

3. When the milk powder diets were modified by replacing the milk powders with a protein equivalent quantity of either a spray-process or a roller-process whey powder and vitamin-free casein, the rats developed the same pattern of smooth-surface caries.

4. Although autoclaving the roller-process whey powder appeared to enhance cariogenicity of diets containing it, this did not pertain to the spray-process whey powder.

5. The results obtained in this study support previous evidence that commercial heat-processing of skimmilk powders may be an aggravating factor of the cariogenic effects shown by diets containing skimmilk powders.

6. The similarity of this experimental rat caries to human smooth-surface caries, further justifies interest in the cariogenic potential of commercial heat-processed foods.

From *Journal of Nutrition* **55**: No. 4, 316 (April 11) 1955.

GENERAL ANESTHESIA

for the Dental Practitioner—Part Two

HAROLD L. HAMBURG, B.S., D.D.S., Brooklyn New York

DIGEST

An anesthetic agent cannot be administered according to a precise formula. Certain generalizations, however, drawn from experience in various techniques will be helpful to the anesthetist in producing narcosis pleasantly and rapidly. In this, the second of a two-part illustrated article, the author gives step-by-step directions for several methods of inducing anesthesia in the dental office.

The Anesthetic Machine

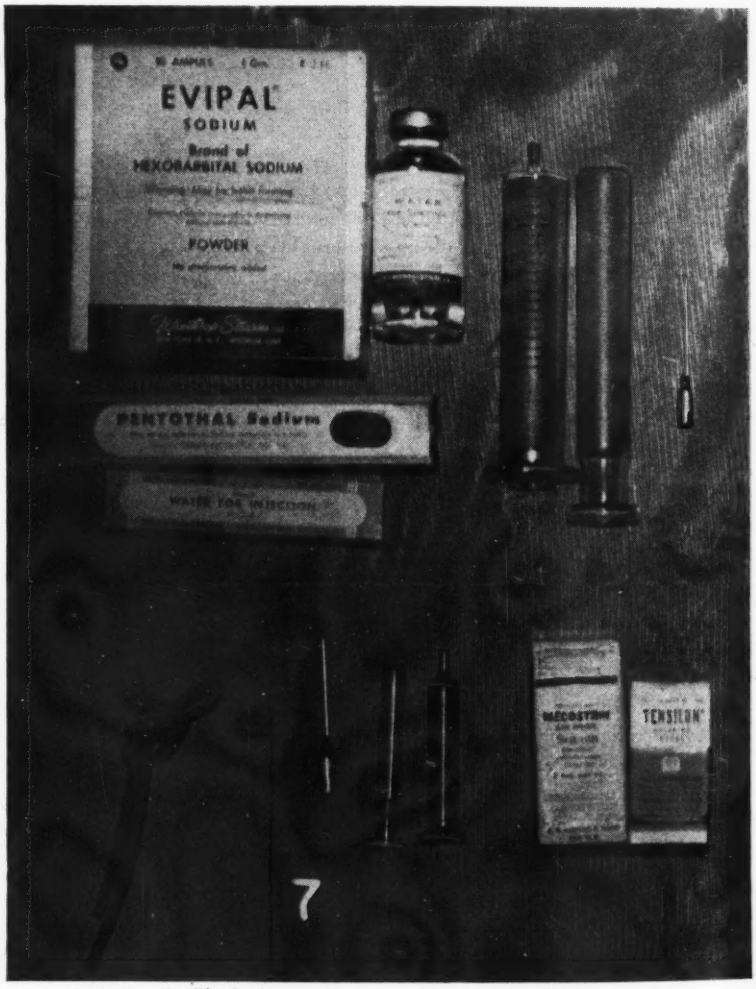
Experience has demonstrated that adult dental anesthesia is best conducted by a modern gas machine having the following controls:

1. Percentage mixtures of nitrous oxide-oxygen
2. Pressure of gases (0 : 60 millimeters)
3. Means of vaporizing a third gas into the mixture

Many anesthetic machines are available. Reference is made in this article to the McKesson Nargraf with an ether vaporizer attached. The vaporizer can be readily translated to any machine.

Machine Adjustments — The rebreathing bag is closed and the exhaling valve is left open. Since there is no rebreathing of gases a fresh supply of the mixed gases is inhaled with each breath. The nitrous oxide and the oxygen tanks are so reduced that the pressure gauges on the machine are at 60 millimeters each.

The Vaporizer—If Vinethene® is to be used as the potentiating gas a wick is placed in the vaporizer. If trichlorethylene is used, the vaporizer is wickless. The volume of liquid does not effect the amount of gas passed into the mixture. The volume of liquid depends on the number of anticipated patients. For Vinethene 10 cubic centimeters per patient are used. Trichloroethylene, 20 cubic centimeters, will last a whole day with an average



7. ***Drugs and instruments: Ultrashort acting barbiturates, sterile water, 20-cubic centimeter syringe, 20-gauge needle, tourniquet, 2-cubic centimeter syringe, curare-like drug Mecostrin,® Tensilon,® its antidote.***

of eight to ten patients per day.

Method of Administration

The patient is seated and the mask adjusted in the manner previously described. The anesthetic machine is adjusted as follows:

1. The percentage dial is set at 80 per cent nitrous oxide and 20 per cent oxygen.
2. The vaporizer is at zero.
3. The patient is allowed to breath this mixture until he is analgesic.
4. The vaporizer valve is now opened slightly. Every ten breaths it is opened another notch until anesthesia is obtained.
5. As the vaporizer is opened pressure is gradually increased to 10 millimeters.

Treatment Started—At the end of approximately fifteen to twenty minutes of anesthesia oxygen is increased to 25 per cent.

Oxygen may be Increased—When anesthesia is obtained the potentiating gas is never decreased. If it is noted that the patient is going into a deeper stage, the nitrous oxide is reduced by increasing the oxygen.

Variations in Method — For the mouth breather increase pressure to 20 millimeters. Be sure that the mouth is packed well. For the hypersthenic patient, start with the vaporizer opened fully and follow the method used for intravenous anesthesia.

Open Drop Method—This is one of the most widely used methods of administration and has a considerable margin of safety in infants and children. The low boiling point liquid anesthetic agents are used: Vinethene, ethyl chloride, chloroform, and ether. Although this method of administration is simple, it is not easily controlled. The anesthetist has only atmospheric oxygen to work with and cannot control the intake pressure.

Value in Dental Anesthesia: The value of the open drop method lies in the unobtrusiveness of the equipment. The apprehensive child will adapt much more readily to an open drop mask.

Agents Used: Ethyl Chloride and Vinethene. Ethyl Ether which is most commonly used in medical anesthesia is not used in dental anesthesia because of its delayed recovery and unpleasant induction.

8. ***Initial puncture: tourniquet applied, arm well supported. Left arm is the choice of a right handed operator.***

Application: Ethyl Chloride is sprayed on the gauze of the mask, care being taken to prevent frost by distributing the spray. Induction to anesthesia usually takes 30 to 60 seconds. Vinethene is dropped on the mask at a rate of 60 to 80 drops per minute.

Gas Machine Employed: Although maintenance of anesthesia with open drop is possible, it is more convenient to switch to the gas machine with nitrous oxide-oxygen in the ration of 80:20 per cent. Open drop method requires the full attention of the anesthetist which is not always possible in the average dental office.

Intravenous Anesthesia—Procedure

The introduction of the extremely short acting barbiturates to be used intravenously has removed virtually all the difficulties attending anesthetic administration. A method is now available in which the patient can be maintained in the lightest anesthesia without the possibility of excitement.

Method Simple—When the inhalation method is used exclusively and the patient is lightened, increasing the potency of the anesthetic gases will produce the required relaxation but only after a reinduced excitement stage. This sudden excitement often makes it necessary to "push" the anesthesia which results in an over-anesthetized patient.

Excitement Stage Eliminated—With the use of the intravenous barbiturate, the introduction of small amounts of the drug will produce anesthesia and awakening is without excitement. The lightened patient presents no inconvenience to the operator since no excitement precedes the anesthetic stage.

Practical Choice—Inhalation anesthesia is the theoretic choice of administration, but intravenous anesthesia is the most practical method.

Methods Available—Three methods of intravenous administration are available

(A) Single dose
(B) Intravenous drip
(C) Initial dose, semidrip

Single Dose Technique—This method is in favor for treatment of extremely short duration.

Indications: Uncomplicated extractions, excisions, incisions.

Advantages: (1) Recovery time is at a minimum. (2) Less barbiturate is used. (3) The anesthetist is free to aid in treatment.

Disadvantages: (1) Since dosage

determination is inaccurate, results are frequently inconsistent. (2) The duration of anesthesia is not controllable.

Technique: Dosage is determined by the weight and physical development of the patient. After the initial 1-cubic centimeter trial dose is administered, the total determined amount is given at once, the syringe is removed, and the anesthetist is free to be helpful in the treatment.

Intravenous Drop—This method is the one most commonly used in hospitals.

Indication: This method is used in nonambulatory patients.

Advantage: Anesthesia is smooth and controlled.

Disadvantage: Recovery time is prolonged.

Technique: The barbiturate is administered drop by drop until narcosis is achieved. The intravenous feeding under control is continued throughout the course of the anesthesia. Various devices such as the Rudder set-up facilitate sustained control.

Initial Dose, Semidrip Method — This technique is indicated for ambulatory patients requiring treatments of ½ to 1 hour.

Advantages: Anesthesia is more rapid than with the other methods and yet is controlled. Recovery time is in average limits.

Disadvantage: The constant attention of the anesthetist is required.

Technique: (1) After the initial trial dose of 1 cubic centimeter, one-half the estimated dosage is administered. This is followed by 1 cubic centimeter every 30 seconds until narcosis is obtained. (2) Contact with the vein and syringe is retained. (3) Treatment is begun. (4) No additional Pentothal® is administered until the patient shows recovery symptoms such as reaction to pain and uncooperative muscle tensions. At this point 1 cubic centimeter of the 3.3 per cent solution is administered. Another cubic centimeter is administered in 30 seconds. (5) Treatment is resumed. One cubic centimeter of the solution is administered every 30 seconds as needed.

9. ***Cubital fossa is prime site for injection. Cephalic and basilic veins are evident. Note that for larger veins the bevel of the needle is down.***

10. ***The wrist veins are a secondary site. Note that the bevel is up for these smaller veins.***

Combination of Anesthetic Methods

In most cases the modified initial dose, semidrip method serves the purposes of treatment of the dental ambulatory patient better than the single dose or drip technique. In a busy practice, however, the recovery time may still be too costly. This can be reduced by combining inhalation anesthesia with the intravenous method. This is the technique of choice wherever possible.

Advantages—1. Recovery time is reduced.

2. Respiration is difficult to hear with intravenous administration alone, but with the nasal inhaler (especially with the Connell valve) respiratory sounds are quite audible.

3. Emergency oxygen is readily available.

4. There is no excitement stage.

5. Little postoperative discomfort is present.

Technique—(1) Anesthesia is induced with the intravenous barbiturate as in the semidrip technique. At the earliest stage of anesthesia, nitrous oxide-oxygen in a mixture 50:50 is introduced. From this point the technique used depends on the course of treatment.

Maintenance of Anesthesia—With a half hour or more of treatment in prospect, a relaxed patient is more important than the length of recovery time. Anesthesia is maintained with 1-cubic centimeter doses of barbiturate. As the end of treatment is approached and the violence accompanying the gases is no longer a possibility, maintenance is obtained by increasing the potency of the inhalation gases. This is done by introducing the potentiating gases. In this manner optimal relaxation is combined with minimal recovery time.

Endotracheal Intubation

This method of inhalation administration has recently become popular. Its principle advantages for the dentist are the following:

1. It is possible to bury the throat pack deeply in the pharynx.
2. The anesthetist and most of his equipment may be at a distance from the field of operation.
3. This method has been found indispensible in cases of cleft palate and in treatment in the third molar area.

Technique — Induction technique remains the same with the exception that a curare-like muscle relaxant (Mecostrin®) is employed. This is mixed with the Pentothal® (1 milligram of Mecostrin to 100 milligrams of Pentothal).

Lightness of anesthesia is maintained although the pharynx is relaxed. At times relaxation may be incomplete. The syringe containing the Pentothal-Mecostrin is carefully separated from the needle and 1 cubic centimeter of Mecostrin is injected. The Mecostrin syringe is removed and the former syringe is replaced.

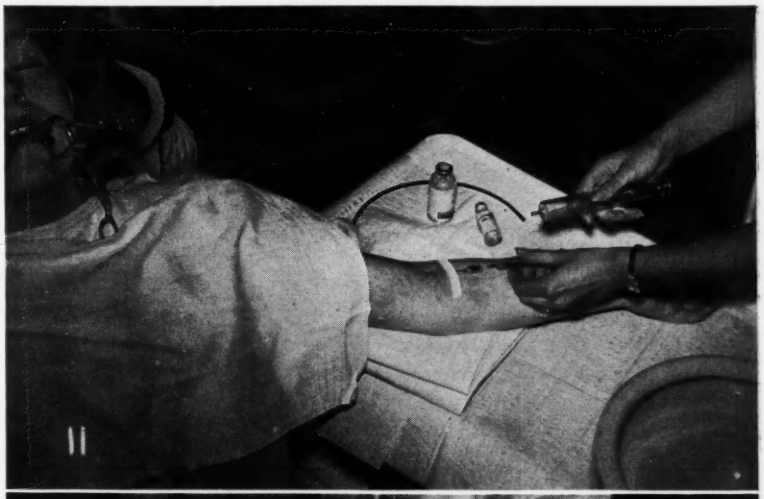
Insertion of Tube—The diameter of the tube is governed by the patient's age and structure. The approach is the same whether oral or nasal entrance to the pharynx is used:

1. The patient is in prone position, the anesthetist is in back of and to the left of the patient's head.
2. With the laryngoscope in the operator's left hand, the patient's tongue is brought forward, bringing the epiglottis into view.
3. The tube is inserted over the epiglottis into the trachea for a distance of about two inches.
4. The throat is packed (an inflatable cuff can be used on orotracheal tubes.)
5. The tube is aspirated for mucus and finally coupled to the gas machine.

Method Time Consuming—Intubation technique is not used routinely because in the time consumed in preparing and intubating the patient most dental procedures can be completed. Often the throat is irritated and the patient is left with a temporary annoying hoarseness.

Emergencies in General

Emergencies are not commonly encountered in anesthesia techniques.



11. ***Introduction of accessory drugs during anesthesia. Changes are made without disturbing original needle.***

12. ***Nitrous oxide-oxygen being added while Pentothal® anesthesia continues.***

Occasionally, however, as with the use of all drugs, an emergency will occur.

There is little inherent danger in the inhalation of intravenous barbiturates. All the difficulties with the latter drugs can be prevented if the following rules are observed:

1. Select a healthy (or medically approved) patient without respiratory impairment.
2. The patient must have an empty stomach. Involuntary retching will be of no consequence if there is no vomitus.
3. The patient must be seated firmly and secured in the chair. An unconscious or excited patient presents difficulties.
4. Preoperative sedation and atropine are necessary.
5. An adequate prop and throat pack must be placed to prevent upset of the balance of gases and passage of debris to the pharynx.
6. All the equipment described must be in working order. At least one trained assistant must be present.

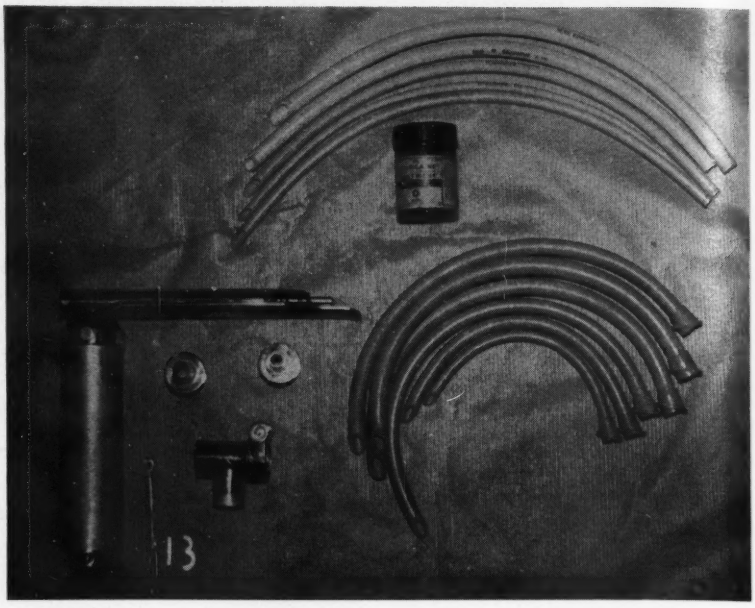
The rules listed will prevent occlusion of the air passages and traumatic injury of the patient in excitement which are the only accidents usually encountered in dental general anesthesia.

Measures in Specific Emergencies

Should one of the safety measures be violated for some reason, the following emergency procedures will be helpful:

Vomiting — The patient's head is brought forward, the mouth prop retained in position but the throat pack is removed and the oxygen is increased to ensure that the gag reflex is present. The patient is permitted to complete his vomiting into a kidney basin. When vomiting is completed, the mouth is cleaned out with a 4 by 4-inch swab and the pharynx is mechanically aspirated. The patient is then reanesthetized and treatment is continued.

Extreme Excitement—Increase the potentiating gas to a maximum (do not reduce oxygen). There must be no air leaks around the mask and throat pack; increase the gas pressure.



13. ***Orotracheal tubes, lubricating ointment, laryngoscope, tube nipples, exhaling valve on T couple, nasal tracheal tubes.***

14. ***Insertion of nasal tube by direct vision of laryngoscope. Patient is in second plane anesthesia induced either by inhalation or intravenous anesthesia.***

If the patient becomes unmanageable despite perfect technique, bring him to consciousness with 100 per cent oxygen and reschedule for Pentothal or increased premedication for the next visit.

Expiration of Oxygen or Nitrous Tank—If expiration of these agents should occur during anesthesia, remove the mask and maintain anesthesia with open drop Vinethene, using approximately 45 drops per minute.

Cessation of Breathing — Check depth of anesthesia, examine head position for mechanical occlusion of the air passage, examine the pharynx for a foreign body, and note the color of the patient. If all these conditions are normal, cessation is voluntary. Increase pressure and wait. The patient

will start breathing in 30 to 60 seconds.

Obstructed Pharynx—If the patient shows lung activity with occlusion or heavy crowing at the larynx, examine the pharynx for foreign obstructions such as mucus or blood. The removal of this cause will generally produce relaxation. If the spasm is persistent, 1 cubic centimeter of Mecostrin may be injected intravenously. Oxygen should be at 100 per cent, at low pressure. High pressure would only force the mucus deeper into the larynx.

Over-relaxed Muscles—If the difficulty is due to an overdose of muscle relaxant as shown by complete thoracic inactivity, 1 cubic centimeter of Tensilon® administered intravenously will neutralize the curare-like substance immediately.

Retching—If there is no vomiting, retching is annoying but not serious. Increase the potentiating agent to deepen the anesthesia.

Coughing—The incidence of coughing is also annoying but not serious.

Cyanosis—The anesthetic machine should show at least 20 per cent oxygen and the pressure gauges should be registering. Correct the position of the patient's head, note the pharynx, and pull the tongue forward. Cyanotic symptoms will disappear with these corrections.

(The patient is assumed to be breathing. If there is cyanosis with cessation of breathing, these directions should be followed.)

Serious Accidents Rare—Respiratory stimulants have no place in the emergency treatment of anesthetic accidents. The treatments of last resort are artificial respiration and tracheotomy. These measures are so rarely required that they do not merit discussion here.

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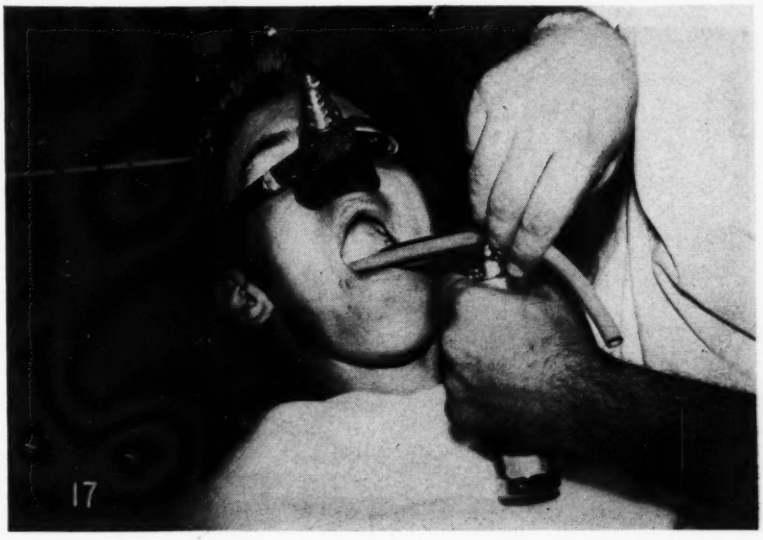
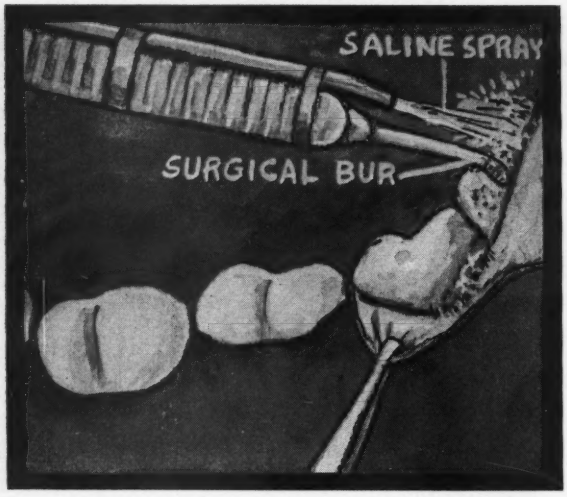


15. ***Throat pack being inserted while chin and nasal tube are supported by the operator.***

16. ***Intubated patient being maintained by inhalation and intravenous anesthesia, properly supported ready for treatment.***

17. ***Orotracheal intubation. Blade of laryngoscope used as guide. Used only in cases of nasal obstruction.***



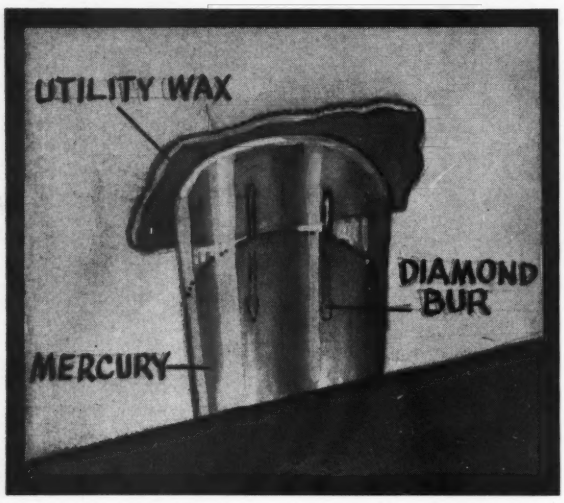
1

Clinical and Laborator

To Prevent Trauma in Bone Cutting

J. Meade Bowman, D.D.S., Knoxville, Tennessee

1. When cutting bone with a surgical bur, tissue injury from overheating may be prevented by using a sterile normal salt solution spray. This is the same kind of apparatus that is used in cavity preparation.

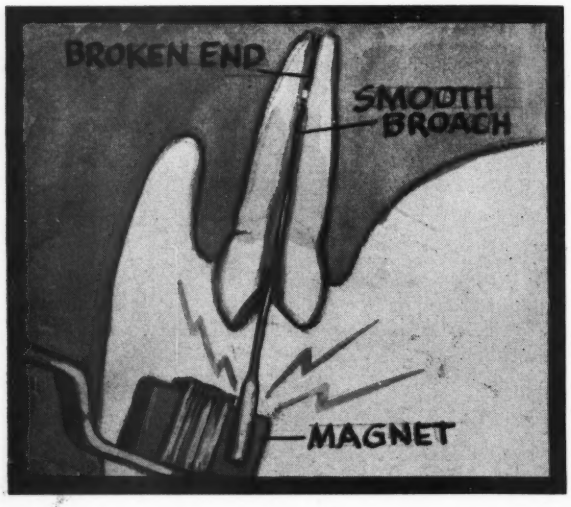


2

Removing Amalgam from Diamond Instruments

R. D. Gillahan, D.D.S., Lawrence, Kansas

2. Set the shanks of the diamond instruments in utility wax. Place the cutting heads of the instruments in a container of mercury and allow to stand overnight. The mercury absorbs the amalgam particles that have clogged the diamond points.



3

Removing Broken Broaches from Root Canal

William S. Cooper, D.D.S., Mineral Wells, Texas

3. Use a magnet from an old PM radio speaker. Insert a smooth broach in the canal to touch the broken fragment of the barbed broach. When the magnet touches the smooth broach, the magnetic forces pass through it to attract the broken fragment.

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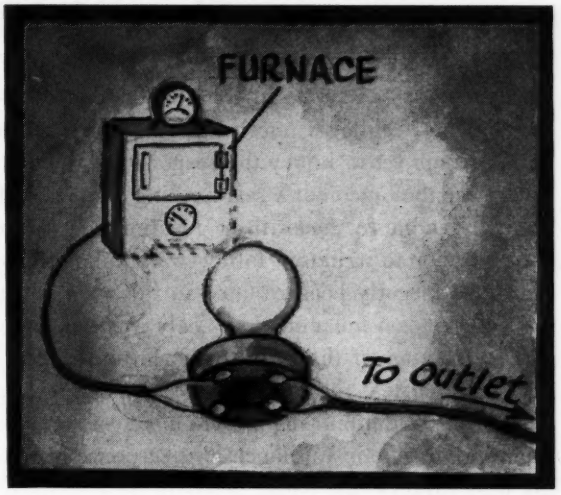
SUGGESTIONS . . .

An Indicator Light for an Electric Furnace

James H. Johnson, D.D.S., Cherokee, Iowa

4. Split the two-wire cord of the electric furnace and slip each of the bare wires under the two-screw terminals of a rosette receptacle. When the furnace is plugged in, the red light will act as an indicator.

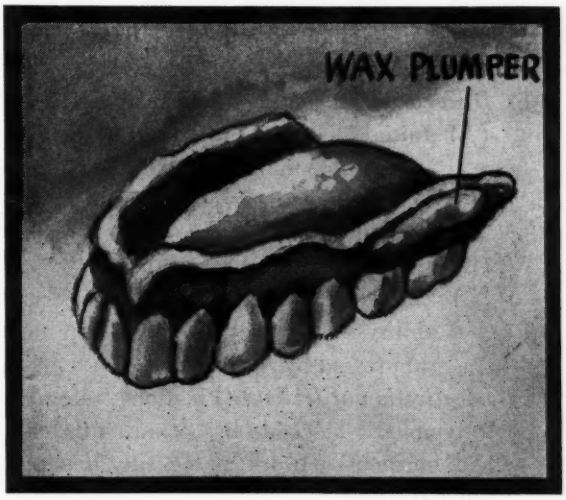


4

Preventing Cheek-biting from a New Denture

C. B. Branson, D.D.S., Lincoln, Nebraska

5. If the beveling of the buccal cusps of the upper molars fails to stop cheek-biting when using new dentures "plumpers" of wax may be placed on the buccal of the denture to push out the cheek muscles.

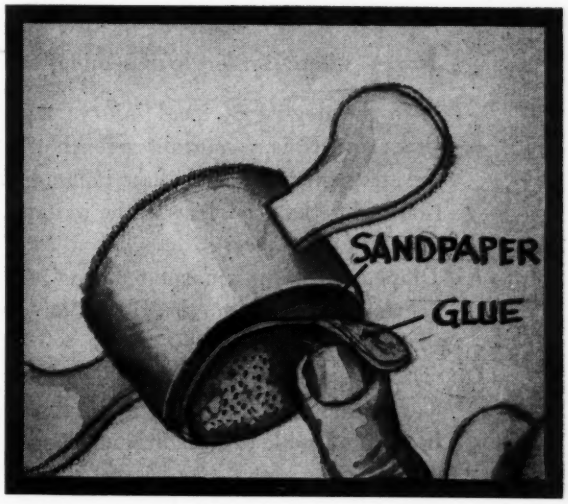


5

Preventing Foot Controls from Sliding

A. D. Misicka, D.D.S., Huntington Station, New York

6. To keep the foot control of the dental engine from sliding on waxed or linoleum floors, glue a piece of fine sandpaper to the bottom of the control.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 183 for a convenient form to use.

Send your ideas to Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S Page

THE RESPONSE of tissue to irritation is one of the fundamental biologic mechanisms. When tissue cells are subject to injury the response of the cells determine the outcome: a self-limiting process with recovery, a more generalized reaction, or death. This reaction to irritation follows well-defined laws that have recently been restated in fuller detail by the authority on inflammation: Valy Menkin.[1]

The reaction of the pulp to the invasive agents in dental caries, the response of the supporting tissues to irritation, the reaction of edentulous tissues to prosthetic appliances, the response following oral surgery, the tissue behavior as a result of orthodontic tooth movement are all subjects of concern to dentists.

Menkin has demonstrated that the biochemical mechanism in inflammation follows this kind of ordered sequence:

"(1) *Disturbance in Local Fluid Exchange:*

(A) Initial increased capillary permeability —referable to liberation of leukotaxine, a crystalline nitrogenous substance; suppressed by cortisone.

(B) Initial increase in lymph flow.

(C) Subsequent increased capillary permeability—referable to exudin—in turn suppressed by ACTH.

"(2) *Localization of Irritant* (Fixation), referable to lymphatic blockade by occluding thrombi and fibrinous network at the site of severe inflammation:

(A) The inflammatory reaction may be considered as a regulator of bacterial invasiveness, i.e.,

$$D = \frac{Kt}{I}$$

where D refers to dissemination; I, to the degree of local injury; t, to time; and K is a constant referable to the anatomical location of the inflammation and to the properties of the irritant.

"(3) Migration of Leukocytes:

(A) Diapedesis of polymorphonuclear leukocytes, referable to the liberation of leukotaxine.

(B) Cytological sequence at the site of inflammation conditioned by the local pH, in turn referable to a disturbance in carbohydrate metabolism; glucose formed by injured cells by deamination of proteins.

(C) Leukocytosis in the circulation, referable to two factors:

(1) Liberation of a thermolabile leukocytosis-promoting factor (LPF) demonstrable in association with the pseudoglobulin fraction of exudates. The LPF induces a concomitant growth of granulocytes and of megarkaryocytes in the bone marrow.

(2) A thermostable leukocytosis-promoting factor associated with the euglobulin fraction of acid exudates.

"(4) *The Pattern of Injury in Inflammation,* referable to the liberation of a toxic substance in the euglobulin fraction of exudates, termed necrosin. This fraction contains proteolytic activity.

(A) Fever with inflammation, referable to the liberation of pyrexin in exudative material. Possibility of also another pyrogenic factor probably in alkaline exudates.

(B) Leukopenia with inflammation associated with the liberation of a leukopenic factor in acid exudates and with leukopenin liberated in alkaline exudates. Pyrexin, the leukopenic factor, and the thermostable leukocytosis factor are, with necrosin, components recovered from the euglobulin fraction of usually acid exudates.

"(5) *Repair,* possibly referable to the liberation of one or several growth-promoting factors in exudates. The factor or factors appear to be diffusible components in exudative material."

The dentist who is concerned with the deeper biologic implications will find the Menkin book a stimulating adventure in new knowledge. An orderly and imaginative piece of research, clearly documented, that demonstrates the repercussions on the organism as a whole that stem from local inflammation will suggest to the dentist that his work is indeed concerned with the general welfare of human beings.

[1]Menkin, Valy: Biochemical Mechanisms in Inflammation, ed. 2, Springfield, Charles C Thomas, 1955, pp. 406-407.

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MEDICINE and the Biologic Sciences

Prostatic Cancer

Prostatic cancer is a major problem in geriatrics. Today there are about 15,000 to 20,000 deaths in the United States each year from prostatic cancer. It is responsible for approximately five per cent of all deaths in men past 50. The sole reason for the greater incidence of this disease is increased life expectancy. At the ninth decade 29 per cent of all prostatic glands show microscopic evidence of carcinoma.

Histologically, the tumors are usually adenocarcinoma although there may be, occasionally, a squamous cell, and rarely, a transitional cell cancer. Histologic grading of prostatic cancer does not appear to have much value in prognosis.

The carcinoma may spread by local extension or by lymphatic and hematogenous metastasis. The tumor extends primarily around the urethra causing obstructive symptoms and often infiltrates superiorly into the base of the bladder and seminal vesicles. The local extension into the trigone and base of the bladder may cause unilateral or bilateral ureteral obstruction. Occasionally, it may extend toward the rectum and almost encircle it. Lymphatic invasion is believed to be a late phenomenon despite the early perineurolymphatic invasion into the prostatic area.

The metastatic nodes metastasize as follows, in order of frequency: (1) the periaortic nodes, (2) the iliac and, (3) almost equally, the tracheal-bronchial nodes. Hematogenous metastases are common and account for the route by which cancer spreads to spine and pelvic bones. Distribution of all metastatic lesions is successively (1) lymph nodes, (2) bones, (3) lungs, (4) liver, (5) pleura, and (6) adrenal glands.

Early diagnosis is essential for curative treatment. Unfortunately, symptoms appear late in the disease process. At the time of the first examination, 85 to 95 per cent of the patients are not amenable to radical surgical removal of the neoplastic process.

The earliest symptom is that of

prostatism due to obstruction of the prostatic urethra or vesicle neck because of infiltrating tumor. Hematuria is usually a late symptom due to ulceration of the mucosa of the prostatic urethra or at the base of the bladder, from the infiltrating tumor. Pain occurs late and is most commonly found in the sacroiliac region, often with sciatic radiation. Late manifestations are inanition, asthenia, and anemia.

Digital examination by rectum with careful palpation of the prostate, base of the bladder and seminal vesicles is the best single method for discovery of prostatic cancer. The importance of frequent examinations (every two years or oftener) for all men over 45 cannot be overemphasized. The early findings suspicious of a malignant prostate are a single hard, fixed nodule or unilateral enlargement with firmness but without fixation of the periprostatic tissue. Late findings include gross enlargement, rocky hard consistency, multiple nodules, infiltration and induration at the base of the prostate and seminal vesicles and fixation to the sounding tissue.

Type of therapy is determined by the extent of the disease. Carcinoma confined solely to the gland is treated best by radical prostatectomy. Castration and estrogen therapy should be employed following the procedure. When the tumor has spread beyond the confines of the gland, therapy is only palliative, consisting mainly of endocrine control of the cancer and maintenance of good urinary drainage.

Leberman, Paul R., and Bogash, Morton: Prostatic Cancer, Geriatrics **9**:439-442 (*September*) 1954.

Maternal Rubella and Fetal Anomalies

There is considerable risk of congenital malformations and stillbirth as a result of maternal infection with German measles during the first trimester of pregnancy. The incidence has been estimated as between 10 to 90 per cent. In general, restrospective observations give far higher values than do prospective studies. Infection during the second or third trimesters apparently entails no fetal hazard.

The need for accurate diagnosis is apparent since an erroneous diagnosis can cause unnecessary anxiety and complications. A child with rubella may easily expose a neighbor or visitor who is in the first trimester.

Recognition of rubella without an epidemic may be difficult because of the lack of pathognomonic sign and of a specific diagnostic test and the similiarity to other diseases. Enlarged lymph nodes are not specific for rubella.

Most children with the disease have no fever or only a slight elevation of temperature, a three-day rash and posterior auricular and occipital adenopathy. Patients occasionally have high fevers and some do not have lymphadenopathy.

In adults, the disease is usually more severe. Malaise, anorexia, and enlarged tender nodes may appear two days before the rash. In children the rash may be the first obvious sign of disease, the adenopathy being asymptomatic.

The differential diagnosis includes several infectious diseases and skin eruptions. Measles, exanthem subi-

IMPORTANT review of chlorophyll therapy

A recently published appraisal,* covering twenty-five years' experience in the medical field, strongly confirms the value of topical chlorophyll therapy. Dental practitioners will be interested to note that clinical opinion is in agreement on these points:

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*Smith, L. W.: The Present Status of Topical Chlorophyll Therapy, New York J. Med. *55*:2041 (July 15) 1955.

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tum, scarlet fever and infectious mononucleosis are the most common misdiagnoses. The rash of measles is preceded by three to four days of high fever, respiratory symptoms, and the pathognomonic Koplik spots. The value of gamma globulin in preventing rubella is still debatable. Apparently, neither the convalescent nor ordinary gamma globulin is consistently effective for prevention of the condition. Moreover, gamma globulin may give a false sense of security by so modifying the disease that no rash appears; the maternal infection will then not be apparent, yet the fetus may be affected.

The patient's age, parity, religion, and other factors must be considered when determining the management of a woman exposed to German measles in the first three months of pregnancy. Abortion and gamma globulin are the two principal factors to be considered. The most effective method for attacking the rubella problem is deliberate exposure of girls to the disease before the child-bearing age. Rigid control is necessary to avoid exposing gravidas. One attack seems to give lifelong immunity.

Krugman, Saul, and Ward, Robert: The Rubella Problem, J. Pediat. **44**:489-498 (*June*) 1954.

Moles

The annual rate of malignancy is only 1.2 per million moles. Therefore, most moles are not treated. Often benign moles are treated for cosmetic effects or for prophylactic purposes as when on the soles, palms, pulps of fingers or toes, genitals, or other areas subject to trauma. Lesions showing suspicious alterations should also be excised.

Those moles with nevus cells found at the epidermal junction are potentially malignant. Lesions consisting of nevus cells confined to the dermis are less dangerous. Compound nevi consist of junctional and intradermal nevus cells.

The various types of nevi cannot always be differentiated without laboratory study. A benign nevus and a malignant melanoma may be similar in appearance. When a mole is treated, biopsy should be done unless the lesion is destroyed. A histologically proved benign nevus has never become malignant.

An intradermal nevus is usually an elevated, smooth, papular lesion. The color varies from flesh to dark brown and hairs may be embedded. This type of mole can usually be shaved off flush with the skin for histologic examination and the base lightly desiccated. A margin of normal skin of about 2 millimeters should be included.

A junctional nevus is generally a small, smooth, flat to slightly raised lesion, usually without hairs and brown to deeply pigmented. Nevi on the palms, soles, pulps of fingers or toes, or scrotum are generally junctional. These should be excised. Desiccation is not advisable because no specimen is obtained for microscopic examination. Histopathologic study is mandatory for suspicious lesions.

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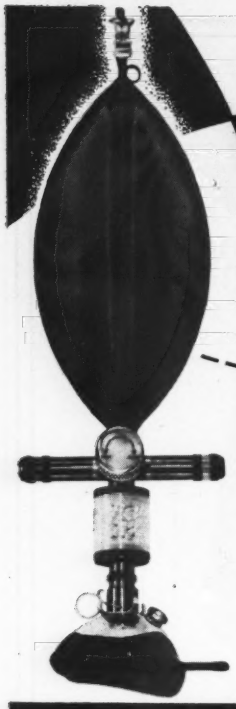

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slightly raised, with or without hairs and moderately to deeply pigmented. Excision is preferred if good cosmetic results can be achieved. If the mole is shaved off and biopsy shows a junctional form of nevus, the area should be exised or destroyed deep enough to ensure eradication of remaining nevus cells.

Ekblad, Gordon H.: Treatment of Benign Pigmented Moles, Arch. Dermat. & Syph. **70**:399-410 (*August*) 1954.

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Contra-Angles

Listening is Good

THAT fine little publication, *Guideposts*, of which the Reverend Norman Vincent Peale is editor offers each month a variety of inspirational short articles. In a recent issue (February 1956) Doctor Peale told how to cultivate the art of listening. Most of us talk too much and listen too seldom. We are so impressed with our own ideas and the sound of our own voice that we begrudge the other fellow the chance to express himself.

I liked particularly Doctor Peale's story of the taciturn old Vermont farmer who spoke infrequently and in a terse pattern. When asked why he had such a dislike for the expenditure of words he replied: "The Lord gave us twice as many ears as mouths, didn't He? Reckon He knew what He was doing."

As an eminent minister Doctor Peale is impressed with the power of the words that Jesus spoke in His short ministry: "Considering Christ's tremendous and redemptive impact on the world, the number of his recorded words is very small. Put together, these words make a very slim volume and total in number only 36,450. Most of the three years of His ministry was spent healing the sick, listening to the troubles of others and praying. Wheneven He needed to replenish His inner resources Jesus went off by Himself for long periods of meditation during which He listened to the counsel of His Father. Therefore, what words Christ did utter have echoed down through centuries and were the foundation upon which Christianity was established."

Less than 100 years ago Lincoln in his Gettysburg address proved that one need not talk long to be effective. On this occasion the principal speak-

er, the Massachusetts orator, Edward Everett, spoke for more than two hours. Lincoln spoke 268 words in less than three minutes. What *he* said will never die.

As we enter the campaign year of 1956 we have already experienced the disputive and long-drawn-out speeches of men and women from both political parties. As the campaigns develop we may expect acute and fulminating logorrhea. If the office seekers listened more to the sentiments of the people and talked less it is quite likely that the country would be better off.

Most of us err repeatedly in talking too much and listening too little. Doctor Peale offers us ten rules on *How to Become a Good Listener:*

"1. Help the other person express himself by asking good questions.

"2. Avoid thinking about what you are going to say until he is finished talking.

"3. Look straight into his eyes.

"4. Show interest. This will depend on the sincere concern and love you have for him.

"5. Practice the discipline of remaining silent *especially* when you are fairly bursting to tell a story.

"6. Give advice sparingly and try not to be a judge.

"7. When you talk, don't hurry.

"8. Never violate a confidence.

"9. Realize you learn most by listening, not talking.

"10. Try the techniques of directing prayer thoughts at the person talking, especially if he is having difficulty or is burdened by a problem."

Time is the Tyrant

As we look about us we see too many men dying too soon, men that the world can ill afford to lose. There is something peculiarly lethal operating among men. Women seem to have a more rugged constitution. It has been suggested that the female sex hormone is protective. Even the glands of men produce small amounts of estrogen. It might be that those men where the production of this hormone is a little higher than the average have greater protection against the degenerative diseases.

There is another factor that oper-

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CLINICAL AND LABORATORY SUGGESTIONS

(*See pages* 174 *and* 175)

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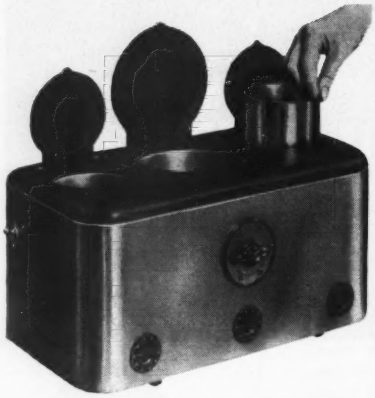

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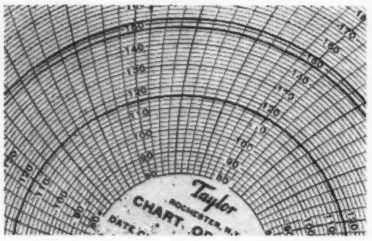

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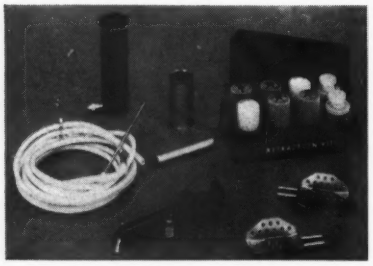

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ates against the longevity of men. That is the tyranny of time: the train and plane schedules, the business appointments, the lunch and dinner dates, the committee meetings, the conferences—these all make men slaves of the clock. Constantly fighting a battle to keep up with the hands on a watch sets off tensions that may have far-extending ramifications.

The dentist is a pathetic case of the slave to the timepiece. His life is run on a time schedule. Every half-hour or every hour he has a new problem to confront and a new personality to encounter. The psychologic adjustments that he must make are stressful to him and stress we now well know is a precursor to organic disease.

One patient late for an appointment, one treatment procedure that requires longer than the dentist planned can throw a work schedule out of balance for the entire day. To make up time and to put the schedule back on the track requires that the dentist put on pressure; he hurries, he begins to worry. These are stresses that lead to trouble.

It is reasonably well established that the tensions, the pressures, the stresses, the tyranny of time to which business and professional men are subject are more dangerous than hard physical labor. Coronary heart disease, for example, is more common among brain workers than among brawn workers.

The dentist who labors all day under a rigid appointment schedule should make an effort to escape from the slavemaster of time on his days of leisure. These should be good times for him to forget his wristwatch and to keep his eyes from the face of the clock. Bogging down without appointments, totally indifferent to the pressure of time, might be the best way to spend his leisure. Not too much food or drink, adequate rest, mild exercise out of doors, complete emancipation from split-second appointments and schedules of any kind may save the dentist—or any other man—the distress of disease that stress brings forth.

—E. J. R.

Weight Control Programs: Diet and Physical Activity

Diet for Weight Control

Numerous food combinations and restrictions with respect to foods have been recommended in weight reduction and control programs. So long as such diets provide fewer calories each day than a person needs, and water is not retained, weight will be lost in proportion to the calorie deficit achieved. Lack of success with many of these diets, however, makes it obvious that level of calorie intake is only one measure of a satisfactory diet.

Essentials for Effective Diet—To be effective on a long term basis, weight control diets should provide for the following situations:

(1) Permit loss of stored fat, where loss is desirable, without damage to body structures.

(2) Permit maintenance of desired body weight after loss by simple ad-

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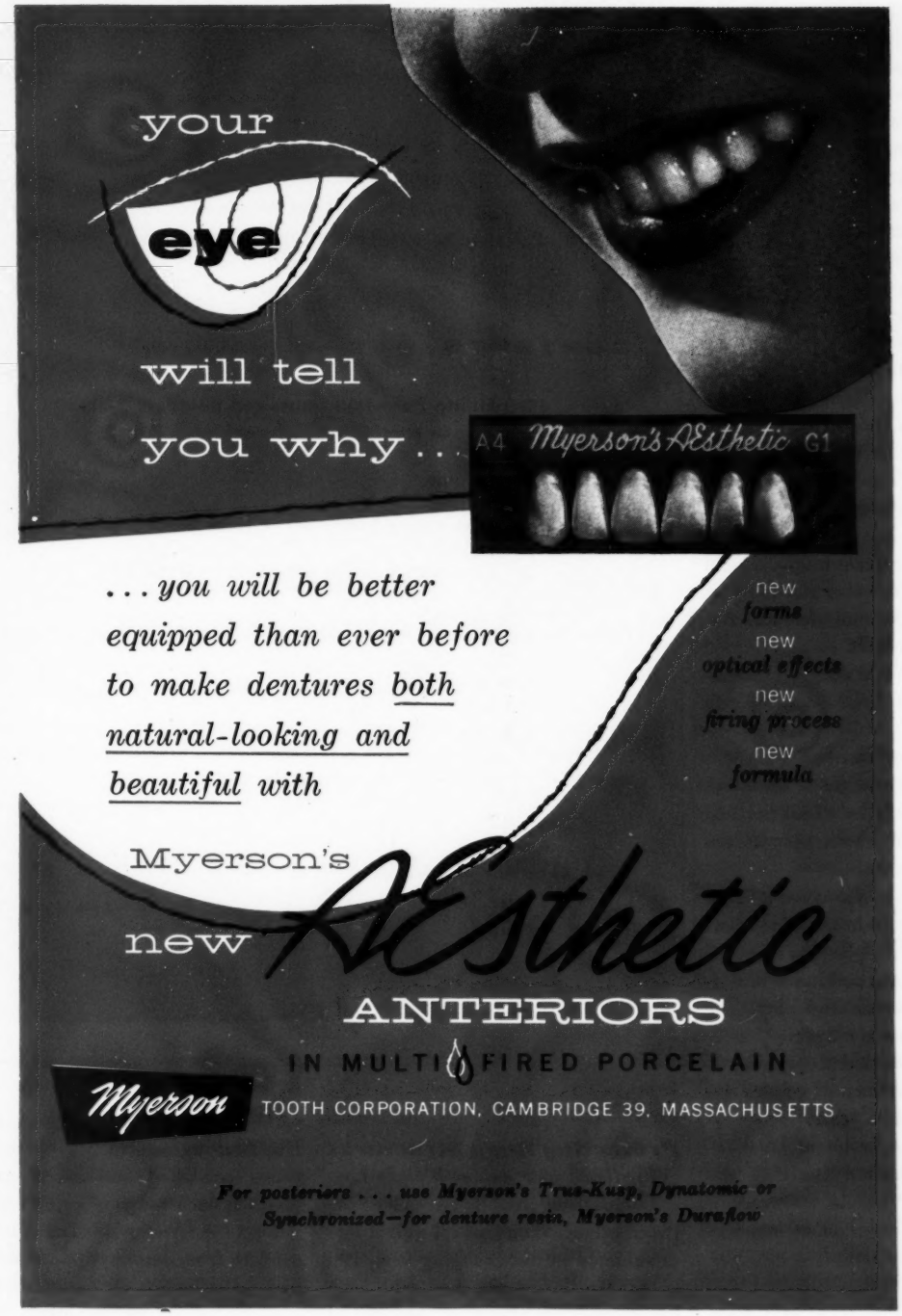
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ditions to the reduction diet.

(3) Serve as a basic pattern of eating which might be followed the rest of the subject's life.

(4) Be planned in a way to preserve and train the appetite.

(5) Provide foods acceptable to the subject and with "staying" qualities to prevent hunger.

(6) Provide variety and interest.

(7) Permit eating with others as an inoffensive member of the group.

(8) Allow pursuit of normal activities without undue fatigue or hunger.

Successful Basic Diet—The regime which has come closest to meeting the listed criteria is a basic diet of 90 grams of protein, 90 grams of fat, and enough carbohydrate to bring the total energy value of the diet to 1500 calories per day.

Variation Possible—The total caloric level can be increased or decreased by altering amounts of the constituents up or down "across the board." For loss of 1½ to 2 pounds per week, daily caloric intake should be 800 to 1,000 calories less than required for weight maintenance. Actual caloric level must be determined according to size and energy expenditure of the subject, and desired rate of loss.

Maintenance of Desired Weight—When the desired weight is achieved, foods can gradually be added until an intake is reached which permits the weight to remain stable.

Factors in Administration of Diet—In successfully administered diets based on these principles, the subjects, all ambulatory, have continued in normal routines of work and play. The following factors are noted:

1. Ages have varied from those of young men and women of college age to those past middle years.

2. Regular weight losses have occurred until desired weight was reached.

3. Individual losses of as much as 70 pounds were achieved.

4. Actual losses have agreed well with those predicted from estimation of individual energy needs with calculations based on assumption that a deficit of 3,500 calories is required for loss of one pound of body weight.

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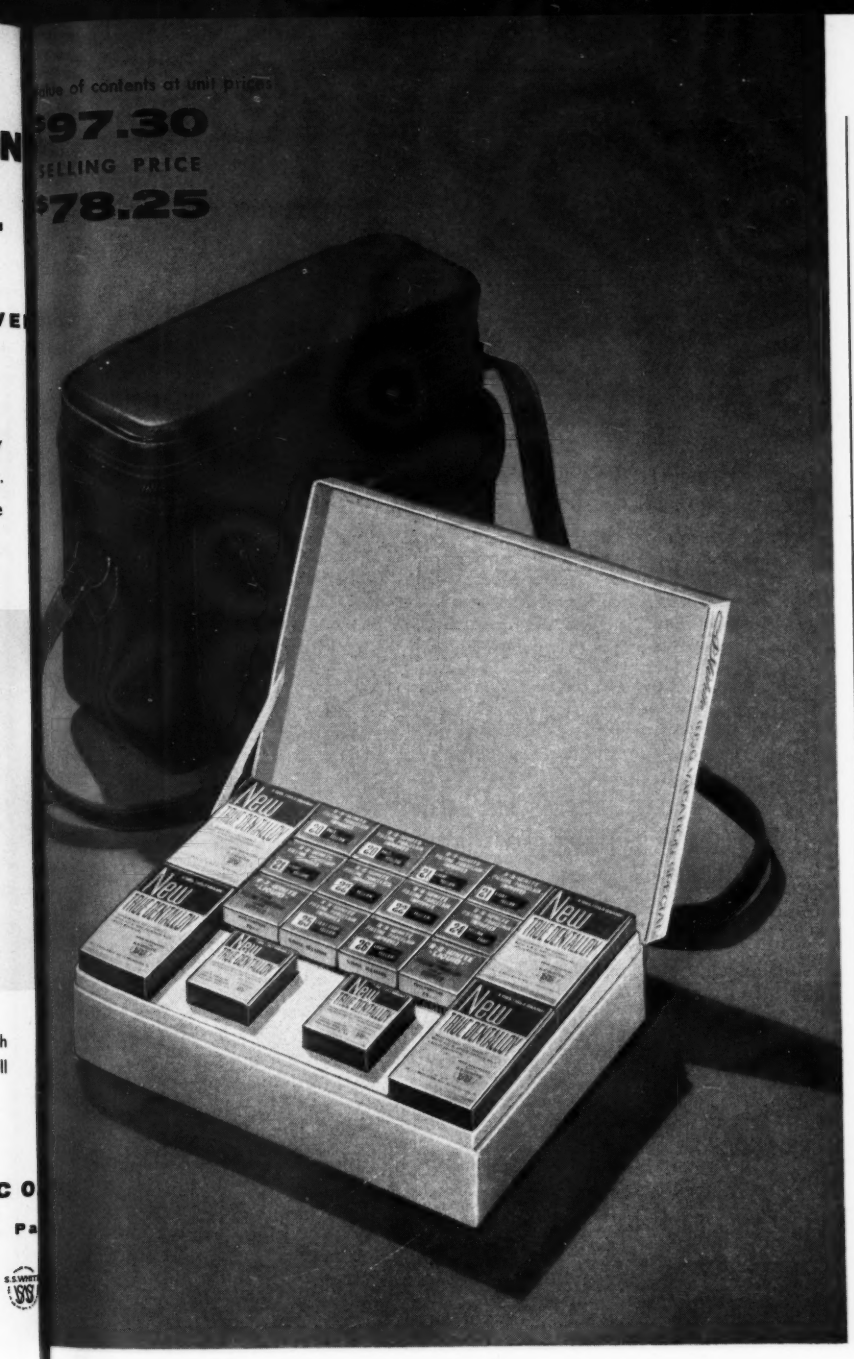
Protecting Body Structures

Predicted and Actual Weight Loss—Comparison has been made between predicted and actual weight loss of subjects on diets ranging from 100 to 1,600 calories per day, with protein intakes varying from zero to 90 grams per day, and fat and carbohydrate intakes varying inversely: percentage of calories from fat being low when percentage of calories from carbohydrate is high and vice versa. Excellent agreement was found between predicted and actual weight losses at each range of calorie intake.

Loss of Nitrogen—The ratio of calories from carbohydrate in the diet had no influence on the relationship of predicted to observed losses. Whenever less than 50 grams of protein or less than 1,000 calories were consumed daily there was loss of nitrogen from the body. In such cases, actual



weight loss was greater than predicted. This difference could be accounted for by losses of body protein equivalent to the amount of lost nitrogen. These losses could not be accounted for by losses of body protein associated with lost body fat.

Body Protein Sacrificed—It is necessary to assume that body protein was being sacrificed under those conditions and weight loss attained at the expense of a decreasing nutritional plane for the subject involved.

Detrimental Loss Unnecessary—For the person who must lose 50 or more pounds of body fat and whose lean tissue mass may already be depleted from long practice of poor eating habits, such loss of body nitrogen may be highly detrimental. Early control of weight would eliminate such undesirable effects of reducing.

Nitrogen Equilibrium Obtained—On intakes of 90 grams of protein and 1,500 calories daily, instead of losing nitrogen, some subjects have shown continuous nitrogen storage while losing from 1 to 3 pounds of weight per week for as long as 30 weeks. Others have shown nitrogen equilibrium on such a diet with a shift to nitrogen loss when calorie intake was cut to 1,200 calories per day.

Natural Food Sources of Essential Nutrients—A high protein diet which includes foods such as milk, cheese, eggs, meat, fish, and poultry also provides natural food sources of other essential nutrients needed to maintain body structures and functions: calcium, phosphorus, iron, essential fatty acids, preformed vitamin A, riboflavin, and thiamine. It is highly desirable to maintain adequate levels of intake of all essential nutrients during weight loss. This becomes more difficult as calorie intake is lowered.

Milk and Cheese Important—Evidence indicates that weight reduction imposes stress on the body's metabolism of nutrients other than protein. For instance, loss of body calcium has been observed to accompany weight reduction with greatest losses when *calcium and calorie intakes are lowest.* Such losses over a long period mean slow but continuous depletion of the mineral stores of the skeleton. Milk and cheese are especially important in weight reduction diets because of the importance of the calcium they provide with protein and some of all the known essential nutrients.

Hunger and Appetite Control

Reduction in the amount of food consumed each day and frequently in the kind of foods used and in their distribution in meals must be accepted. Whenever subjects have been given the classical weight reduction diets of one gram or less of protein per kilogram of body weight with almost no fat and 1,000 to 1,200 calories per day, they have complained almost constantly of a desire for food.

Fat a Palatable Addition—From the responses of subjects on weight reduction diets, there is no doubt that it is easier to control hunger on an intake of 1½ grams of protein per

kilogram of predicted normal weight than on one gram or less; and that 90 grams of fat per day make meals more palatable, interesting, easy to select from the family table or restaurant menu, and aid in control of appetite after as well as during weight reduction.

Higher Fat Intake Chosen—Diets containing only 20 grams of fat per day are considered dry, uninteresting, and hard to eat. While 40 grams of fat per day make meals acceptable subjects uniformly choose the higher fat intake if choice is permitted and with it seem to have less desire for foods which are forbidden.

Three Equal Meals Advisable—Hunger is more easily controlled and appetite maintained when three approximately equal meals are consumed each day. This frequently means retraining appetite to accept larger amounts of food at breakfast and lunch and less food at the evening meal.

Physical Activity

While food intake does increase with increased activity and decreases with decreased activity within normal range of human or animal activities, this does not hold true in either sedentary or exhaustive levels of exercise.

Sedentary Range of Activity—Considerations of interdependence of food intake, physical activity, and body weight are of great interest in the sedentary range of activity. Voluntary food intake does not decrease with decreasing activity to the low level necessary to prevent increase in body weight. Conversely, increasing activity within the sedentary range to the level of medium physical work results in a decrease of food intake and body weight.

Physical Exercise Beyond Sedentary Range—Food intake increases and body weight remains stable at a nonobese level until the exhaustive level of activity is reached where food intake and body weight sharply decrease. Obesity among children and teenage girls has been found more closely associated with relative inactivity than with greater food intakes when compared with their nonobese counterparts in terms of age and sex.

Caloric Expenditure of Physical Activity in Weight Control Programs—This is the outstanding factor causing variability in caloric needs. The truly sedentary person may have a caloric requirement of as little as 1.2 times his basal metabolism. The person doing extremely heavy work may have a caloric requirement of as much as 4 times his basal metabolism. Between these two extremes, each physical action in which a person engages has a specific cost in terms of energy burned within the body. This energy must come either from food eaten daily or from stored body fat.

Exercise an Aid in Weight Reduction—Regular moderate exercise can aid realistically in weight reduction and in weight maintenance, for in either case it permits the subject to eat a more satisfying level of food than would be possible if he remained sedentary.

Adapted from *Dairy Council Digests* **27**: No. 2 (November) 1955.

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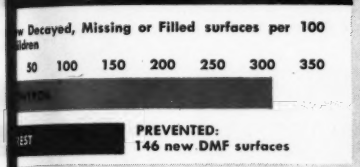

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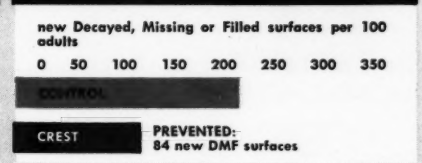
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(c) Calorie for calorie you don't get your calorie's worth; dollar for dollar you don't get your dollar's worth in this type of dessert item. You get more for your calories and more for your dollars in desserts of custard, milk puddings, molded desserts made with unsweetened gelatin, fresh sliced fruit topped with yogurt, or just plain apple or pear with a sharp cheese. This recommendation should apply to children as well as to adults.

Adapted from *Modern Nutrition* **8**:5 (July) 1955.

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